REPORT

ON

HORSE SURRA

BY

ALFRED LINGARD, M.B., M.S., DURHAM;
Diplomate in Public Health, Cambridge;
Fellow of the Bombay University;
Professor of Bacteriology and Comparative
Pathology—Civil Veterinary Department, India.

WITH 10 COLLOTYPES AND NUMEROUS CHARTS.

VOL. I.

Bombay:
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Bombay. Civil Veterinary Dept.

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To

VETERINARY-LIEUT.-COL. J. H. B. HALLEN, F.R.C.S.ED.,
F.R.S.ED., C.I.E., Inspector General, Civil Veterinary
Department,
Simla.

September, *1893.*

SIR,

I have the honour to submit the first portion of my Report (Vol. I) on "Naturally Acquired and Experimental Surra" in Horses, together with the results of an enquiry into the experimental treatment of the disease.

2. The Report is divided into three portions :—

Vol. I.—Containing Horse Surra and experiments with the Infusorian taken from the Horse.

Vol. II.—Surra as it occurs in Rats and Dogs, and the presence of the Infusorian in certain kinds of Fish.

Vol. III.—The minute pathology of Surra in Horses, &c., and the Life-history of the Infusorian.

3. In addition to the above researches on Surra, investigations have been made and reports submitted at intervals on the following subjects :—

(i) M. Pasteur's Vaccin for Anthrax.

(ii) The presence or absence of the Bacillus Anthracis in several specimens of animal lymph, submitted by H. B. M.'s Consul, Goa.

(iii) Inoculation experiments with material taken from four suspected cases of Rabies in dogs; to determine the necessity or otherwise, of sending to Paris, for treatment, the persons bitten by the suspected animals.

4. The reasons the Report has not been submitted earlier are—

(i) That, although up to the autumn of 1892 numerous experimental Surra inoculations had been carried out, no opportunity occurred for observing in horses the naturally acquired disease, as no outbreak took place during the period of our observations.

(ii) As for practical purposes the naturally acquired disease is all important for the experimental enquiry into the mode of treatment, a considerable outbreak of the disease was needed, before sufficient cases could be obtained to investigate the effects of different preventive and curative agents. The opportunity for these investigations was afforded by the outbreak which appeared in September 1892, and lasted until February 1893.

(iii) The necessary charts and illustrations could not be finally reproduced at the Government offices at an earlier date.

Veterinary-Captain J. Cooper, A. V. D., worked as my coadjutor in this enquiry from October 28th, 1890, to April 20th, 1891.

Veterinary-Lieutenant H. T. Pease, A. V. D., Superintendent, Bacteriological Survey of Disease, India, was attached to the Laboratory from 9th December 1891 to December 10th, 1892. During this period this officer rendered me invaluable aid in the daily examination of the blood and urine of diseased animals; and I am further indebted to him for his advice in the treatment of cases, especially in that of horse No. LXXI.

I wish to convey to the following officers and gentlemen my sincere thanks for the information regarding Surra, which they have been good enough to communicate to me; and particularly to Messrs. Buckland, Mills, and Rimington, for the horses they kindly placed at my disposal for the purposes of observation and treatment :—

Veterinary-Lieutenant-Colonel W. T. Russell, A. V. D., P. V. O., India.

Veterinary-Captain J. Mills, C. V. D., J. P., Principal, Bombay Veterinary College.

Veterinary-Lieutenant G. H. Evans, Superintendent, C. V. D., Burmah.

Lieutenant J. Badwin, R. A., Bombay Mountain Battery.

H. W. Buckland, Esquire, M.F.H., Bombay.

F. C. Rimington, Esquire, Managing Director, Bombay Tramway Company.

I wish also to place on record the debt of gratitude I owe to the late Veterinary-Lieutenant John Steel—for some years Principal of the Bombay Veterinary College—who was instrumental in obtaining material for the commencement of this investigation, and who so generously gave me the benefit of his knowledge and experience.

I have the honour to be,
Sir,
Your most obedient Servant,
ALFRED LINGARD,
Imperial Bacteriologist.

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Page	1,	*line* 5,	*from top*	*for*	Steele	*read*	Steel.
,,	9,	,, 46,	,, ,,	,,	Steele	,,	Steel.
,,	15,	,, 5,	*from bottom*	,,	and is one	,,	and it is one.
,,	21,	,, 17,	*from top*	,,	Peyers	,,	Peyer's.
,,	50,	*foot note*		,,	Griesiner	,,	Griesinger.
,,	63,	*line* 40,	,, ,,	,,	similate	,,	simulate.
,,	72,	,, 11,	*from top*	,,	anthorax	,,	anthrax.
,,	81,	,, 7,	*from bottom*	,,	Peyers's	,,	Peyer's.
,,	104,	,, 12,	*from top*	,,	Salycilic	,,	Salicylic.

EXPLANATION OF TERMS, &c.

The first day of the disease is that upon which the Surra hæmatozoon is present in the blood, either when contracted naturally, or as the result of inoculation.

Petechiæ } These are used as synonymous terms.
Ecchymosis }

Some diameters have been given as equivalent to that of a rupee, eight, four, and two-anna piece. The following are their measurements in inches and in centimetres :—

Rupee = 1·25 inches = 3·17 centimetres.
Eight-anna = ·0375 „ = 2·38 „
Four „ = ·750 „ = 1·904 „
Two „ = ·625 „ = 1·58 „

The terms 'Hæmatozoon' and 'Organism' have reference to the Infusorian found in the blood of horses, the subjects of Surra, if not otherwise defined.

The terms and abbreviations, Absent (A), Few (F), Numerous (N), Very numerous (VN), and Swarming (S), have reference to the number of hæmatozoa present in each cover-glass specimen of blood examined microscopically.

F =From one hæmatozoon in a cover-glass preparation of blood, to five hæmatozoa in a field of the microscope.
N = „ five „ „ „ to twenty in each field.
VN = „ twenty „ „ „ to fifty in each field.
S = „ above fifty ;
Zeiss object D, ocular 4 with the tube in, being employed.

Variation of temperatures of animals in health at the Laboratory :—

Horse—Normal limits between	99·0°F	101·0°F	=	37·2°C	38·3°C.
Donkey— „ „	96·4°F	97·8°F	=	35·8°C	36·6°C.
Ox— „ „	100·0°F	101·0°F	=	37·7°C	38·3°C.
Sheep— „ „	103·0°F	104·0°F	=	39·4°C	40·0°C.
Goat— „ „	101·8°F	104·3°F	=	38·8°C	40·2°C.
Dog— „ „	98·6°F	103·6°F	=	37·0°C	39·8°C.
Cat— „ „	98·6°F	101·5°F	=	37·0°C	38·6°C.
Rabbit „ „	101·8°F	103·6°F	=	38·8°C	39·8°C.
Guinea-pig— „ „	101·1°F	103·0°F	=	38·4°C	39·4°C.
Fowl— „ „	105·8°F	108·7°F	=	41·0°C	42·6°C.
Pigeon— „ „	105·8°F	109·4°F	=	41·0°C	43·0°C.

The temperatures of the large animals were taken three times daily—between 7 A.M. and 8 A.M., 1 P.M. and 1-30 P.M., 5 P.M. and 6 P.M. ; that of the smaller animals and birds usually twice daily—8 A.M. and 5 P.M.

Precautions observed before taking blood from an animal for experimental purposes.

The part was carefully washed with soap and water, and subsequently with a solution of Mercuric Perchloride, 1 in 1,000.

Each animal had a lancet, ticketed with its number, assigned for the purpose of blood letting ; this instrument was specially kept for this animal alone, and after use, was boiled for a period of ten minutes before being used again for the same animal.

The person, collecting specimens of blood from the affected animals for microscopical examination in each instance, washed his hands carefully after handling one, and before proceeding to another animal. This precautionary measure was adopted on the 15th January 1891, and has been since carried out.

For the purposes of record, the blood of the experimental animals and birds was subjected to microscopical examination once daily in the morning, unless points of interest made it necessary to make observations later in the day.

Blood.—In investigating the condition of the blood of the experimental animals and birds in all cases, since the commencement of this enquiry, two large cover-glass preparations have always been taken daily from each animal, and submitted to careful microscopical examination. If there was doubt on any point, or interesting details had to be cleared up, further specimens of blood were obtained and noted as required.

Pathological conditions found at the Autopsies.

In numerous instances in horses, caseous bodies or masses have been described as having been found invading the tissues of the Lungs and Liver. These bodies are due to pathological changes, which have taken place at a period antecedent to that when the animal became the subject of Acquired or Inoculated Surra.

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SURRA.

SECTION I.

Definition.

Surra is a specific and continuous febrile disease occurring spontaneously in solipeds and camels, and capable of being transmitted by inoculation to other animals. It is due to the presence in the blood of an Infusorian (*Trypanosoma Evansi*). It is chiefly met with in an epidemic form, during certain months of the year, viz., between July and January. It is characterized by an intermittent, remittent and sometimes a relapsing type of fever, which continues for varying periods, from a few days to months, according to the species and the constitutions of the animals attacked, and presents definite symptoms following each other in regular sequence. The chief symptoms in addition to the fever are the occasional appearance of an urticarial eruption, general or localized, closely following the first rise in temperature, but which may make its appearance at any time during the course of the disease; then the presence of petechiæ on the mucous membranes, chiefly those covering the membrana nictatans; lachrymation, and the exudation of a yellow semi-gelatinous material into the subcutaneous and other connective tissues. There is rapid wasting and great weakness, although in the great majority of cases the appetite remains good throughout, no matter how high the fever. There is extreme pallor of the visible mucous membranes, and this is followed at a later period by yellowness. From first to last there is progressive anæmia; the blood at first presents a normal character, but after a varying period of time undergoes marked changes. The white corpuscles are increased in number and the red corpuscles usually cease to form normal rouleaux, lose their individuality and run together, forming irregular masses, which are at first dark, but gradually as the disease advances, almost entirely lose their colouring matter, and become pale.

The presence of the Infusorian is not continuous during the whole course of the disease. At first it is usually found in small numbers in the blood, and increases with greater or less rapidity, until having attained a maximum, it disappears either gradually or suddenly to re-appear after an interval. The periods during which it is present in, and absent from the blood, are marked by extreme irregularity, varying from one to six days, but the latter number is very unusual.

The disease is invariably fatal; death being generally due to exhaustion, but sometimes to concurrent complications. After death no specific lesion is present, but as a rule there are small sub-pleural and sub-endocardial extravasations, together with enlargement of the liver and spleen, and if death takes place during a paroxysm, the hæmatozoon will be found for a certain time in the blood.

SECTION II.

NOMENCLATURE.

"According to Evans the name 'Surra' is used by the natives to denote anything rotten, and is applied by them to a dry-rot, such as a withered leaf, and to a moist rot, such as a putrid carcass. The name is thus a very comprehensive one, and is applied loosely to all chronic ailments of a lowering character which have not a specific designation. A native will speak of himself as *Sur gia* (gone rotten), when he has felt for some time in ill-health and does not know what he suffers from. The name 'Surra' is given to this disease among horses as a distinctive designation, because a withering or falling off in condition is a marked feature in its progress without any visible lesion *post mortem* to account for it."

SECTION III.

HISTORICAL ACCOUNT OF SURRA.

Our first knowledge of this disease was communicated by *Evans, in a report dated November 1880, to the Government of India. The malady, he designated 'Surra,' and defined it as a specific, parasitical, non-inflammatory, enzootic, blood disease, characterized by fever, jaundice, petechiæ of the mucous membrane, especially of the eye and vagina, dropsy, sometimes albumen in the urine, great prostration of strength and rapid wasting, and with a specific parasite in the blood during life; but no characteristic structural organic lesions are found after death. It may be transmitted by the subcutaneous injection of blood, and by drinking fresh blood containing the live parasites, but is not contagious or infectious in the ordinary way. The average duration of the disease is probably less than two months, but reliable statistics are wanting upon that point. He describes the invasion of the disease acquired in the ordinary way as that common to all low fevers. In a small majority of cases the sub-maxillary gland may be enlarged and tender; in a large proportion of cases the legs are swollen and œdematous, later a similar swelling is found between the fore legs of mares, or at the sheath of horses, and the animal is dropsical; there is great thirst, and the urine is high coloured.

The conjunctival membranes become decidedly yellow in colour, with claret coloured spots on the membranæ nictitantes. In the case of a mare, the mucous membranes of the vagina are decidedly yellow, with petechiæ even more marked than in the eye. The duration of the disease is a difficult matter to settle, and depends on the constitution of the animal; weak animals succumb sooner. The progress of the disease is variable; the symptoms may sometimes subside and again return worse than before; the most constant and invariable symptoms in the progress of the disease is the wasting away of the flesh, and this is the more remarkable, seeing how much and with what good appetite the patient eats. The wasting goes on more rapidly in some cases than in others. The records of the 4th Panjab Cavalry show an average duration of 43 days after the admission on the sick list; whether they die early or late, they are generally reduced in condition to mere living skeletons.

---

* Report on Surra by Inspecting Veterinary Surgeon G. Evans, M.D., published by the Panjab Government, Military Department, No. 439—4467, 3rd December 1880.

There is often much anæmic palpitation of the heart in the last stage, and the membranes become blanched : some animals drop down and die suddenly, perhaps when eating, others become delirious and struggle on the ground, while other animals linger for days after they are helped up, but go on eating grass and corn until they die.

Evans noted a certain amount of clear serum in the peritoneal cavity, but no sign of any inflammatory action. In one case the pericardial sac was distended with fluid.

He says "that when he first saw the parasite, he thought for a moment, it was some form of Spirillum, but rapidly changed his mind on that point. It has an apparently round body when it is fresh and active, which tapers in front forming a neck, ending in a blunt head, and behind it has a tapering tail from which there extends a long slender lash, so fine that it can seldom be seen. It had two fin-like papillæ on each side, one pair placed near the neck, and one near the tail. He only occasionally saw the four at once, and they always appeared to occupy the same relative positions.

He describes the parasite as being wonderfully active, and presenting undulatory eel-like movements ; it has the power of altering its shape, progressing almost always in the direction of the blunt end, though it is able to go in the reverse manner when pulling a corpuscle. He examined the kidneys, liver, spleen, heart, lungs, and the mucous lining of the stomach and intestines throughout, with great care, and stated positively that this disease is not characterized by any structural organic change ; it is purely a disease of the blood. Petechiæ were noticed on the mucous lining of the intestines in some cases, but in no case was the structure of the liver diseased. The disease is absolutely fatal to horses, mules and camels.

There is no evidence to show that the disease is either contagious or infectious in the ordinary sense ; the weight of evidence is to the contrary. Seventy-seven horses of the 3rd Panjab Cavalry became affected at Jutta, and were taken to Edwardabad and all died, but did not communicate the disease to others. He considers that when horses are closely packed together, a large fly called "Burradhang" may inoculate healthy animals with the blood of the diseased.

Evans submitted a puppy, inoculated with Surra parasites transferred from the horse, to Dr. Lewis for his opinion. Lewis reported that "the parasites appeared to be very closely allied to the flaggellated variety, which were detected by himself in a considerable number of apparently healthy rats, but he could not then venture to express an opinion as to whether they were specifically identical."

Major Money, 4th Panjab Cavalry, stated that the disease was common amongst the horses of the 3rd Panjab Cavalry when they obtained the grass from inundated ground near the River Indus, but it ceased when they got grass from higher ground. The outbreak takes place usually in August, but more in September, and continues until January when it suddenly ceases.

Treatment.—The only form of treatment Evans tried was Carbolic Acid in Glycerine (1 to 4), of which 219 drachms were administered during a period of 15 days, and still the organisms persisted in small numbers in the blood. The dose was then increased to 3 oz. daily for a week, with no better result. He tried with three other animals the same treatment, but they all succumbed.

*Steele, five years later, reported upon an outbreak in British Burmah.

The animals which he had to deal with, and which he made *post-mortem* examinations on, were transport mules. He was much struck with the lesions found in the stomach, so provisionally termed the disease Gastric-typhoid fever of malarial origin ; at a later date, when he had made careful thermometric observations, he came to the conclusion that the disease must be regarded as a true relapsing fever, closely resembling relapsing fever in man, and was essentially the same as the disease described in 1880 by Evans as "Surra," and only differed from it sufficiently to warrant his considering them as local varieties of the same disease.

---

* Steele, Veterinary Surgeon J. H., Army Veterinary Department, on his investigation into an obscure and fatal disease amongst transport mules in British Burmah, 1885.

Steele carefully watched and recorded the symptoms of the disease, confirming and adding to those previously described by Evans. He communicated the disease to the mule, pony, dog and monkey, but was unsuccessful in his trials to inoculate bullocks and goats.

He found that the size of the parasite varies in different cases; usually $\frac{1}{6}$th the diameter, and 3 to 6 times the length of a red blood corpuscle. In the fresh state it is an eel-like body; dried and stained it looks like an oxyuris on a small scale, with a thick portion in its body, and a spiral tail. The body portion tapers in either direction; anteriorly it terminates rather abruptly and is somewhat rigid, and there is apparently a hold-fast organ at the blunt extremity. He describes the movements as being eel-like, lashing and vermiform, less frequently spiral, and believes the parasite to be a form of spirilloid, closely related to the spirillum found in relapsing fever in man.

He concludes by defining the disease thus:—Relapsing fever of mules is an invariably fatal disorder, characterized by the periodical occurrence of attacks of high fever, during which a special organism, closely resembling that of spirillum fever of man, is found in the blood. The organism causes dis-organization of the blood, which is to an extent repaired during the inter-paroxysmal phases, and thus the patient is usually able to hold up against the disorder for some time. But anæmic symptoms and lesions gradually accumulate and culminate in death from exhaustion, plugging of vessels, or gastric perforation as a result of local atrophy of the stomach. In some cases the symptoms are acute and the animal succumbs to the height of the fever.

*Gunn, in 1886, reported on an outbreak at Kohat, on the N. W. Frontier among the grass-cutters' ponies, belonging to No. 1 Kohat Mountain Battery.

He noted the usual symptoms of Surra in the four affected animals. On microscopical examination of the blood, he observed numerous minute parasites, somewhat like eels, which appeared to vigorously attack the red corpuscles; the parasite is not to his mind a spirilloid, nor does it resemble a nematode or round worm; the pseudopods described by Evans are really the margin of the sides "waved." He estimates the total length at about ·0003, and the greatest breadth at ·00023 of an inch. He examined the urine of the four patients microscopically, and states that in three he found parasites, non-motile and probably dead. As to the mode of contagion, he thinks stagnant water was the source, for the following reasons:—

A.—Only grass-cutters' ponies were attacked by the disease.

B.—No mule belonging to the Mountain Battery, nor horse from the Panjab Cavalry became ill of the disease.

C.—The grass which the grass-cutter's ponies bring in is alike eaten by mules, horses and ponies.

D.—The mules and horses were watered at a stream, which runs from a mountain spring through the Cantonment of Kohat, and at no other place.

E.—That the grass-cutter's ponies are watered at any place, pool or otherwise, which happened to be at hand.

F.—The ponies stand in the same lines and partake of the same grain as the other animals, and the same system of sanitation appertains to all mules in the Battery and Regiment.

Experiments.—He inoculated a dog from a pony on the 20th September, and on the morning of September 24th many parasites were found in the blood.

The following is an abstract of a report by Veterinary-Surgeon C. E. Nuttall, A.V.D., on two outbreaks of 'Surra' at Meerut during the years 1886 and 1887, amongst the horses and baggage animals of the 19th Bengal Lancers. These observations were made under the personal supervision of Inspecting Veterinary-Surgeon W. T. Russell, 2nd Circle, at the present time the Principal Veterinary Officer in India.

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* Gunn, Veterinary Surgeon, Army Veterinary Department, Quarterly Journal of Veterinary Science in India, Volume V, page 235, 1887.

The outbreak in 1886 commenced on the 3rd July, and terminated on the 22nd December of the same year. During this period 48 animals succumbed to the disease, viz., 25 horses and 23 grass-cutters' ponies, thirteen and six of each respectively having died, the remainder being destroyed. For those animals which died, the average number of days of the disease was for horses 36, and for ponies 6.

The outbreak of 1887 extended over 151 days, from September 6th, 1887, to February 4th, 1888, and attacked horses, ponies and mules. Forty-seven in all died or were destroyed.

Veterinary-Surgeon Steele happened to be in Meerut at the time of the epidemic, and at once recognised the disease as Surra, organisms having been discovered at a later date in the blood of 15 out of 20 animals examined. It is of interest to notice that seven other animals were discovered suffering from fever, with yellow and petechial condition of the conjunctivæ, and a more or less degree of constitutional disturbance, (symptoms frequently recognised by us in Poona, and by G. H. Evans in Burmah), but these animals were not affected with Surra and recovered after a few days.

The outbreaks in Meerut as in other localities have occurred only at a special time of the year, *i.e.*, from the rainy season well into the cold weather, and up to the present time there are no sporadic cases on record as having occurred at this station at other times of the year.

The deaths during this period were in September, 10, October, 26, November, 7, December, 2, and January, 2. The average number of days of disease in cases that died, being for horses 52, ponies 30, and mules 19. In this series of cases, the Surra parasite was found in the blood at different periods of the disease in 43 out of the 47 attacked. Veterinary-Surgeon Nuttall apparently experienced the same difficulty in determining the exact commencement of the attacks in animals as has been found by other investigators. All attempts at curative treatment were negative.

As regards the *post-mortem* appearances of the stomach, Mr. Nuttall states "that it may be found in some instances replete with food, in others a little partly digested blood-stained material, fibrinous clots, &c.; and the organ usually the seat of special lesions; which may be ulceration or erosion either of the cuticular or villous portions, usually confined to the former, extending in some cases to perforation; the villous portion in places denuded of the epithelial lining, resulting from degenerative changes, and yellow pigmentation of varying intensity is constantly seen."

In the appendix to the report, it is stated that gastric lesions were found in the case of 25 horses, 15 ponies and 2 mules.

* Ranking published in June 1891 a preliminary report, in which he states his opinion, that Surra is a disease of malarial origin comparable to ague, and that this view of the pathology of "Surra" is borne out both by the period of prevalence of "Surra" which corresponds with that of ague, and also by the results of treatment. Quinine in full doses appears to control the disease, supplemented by general measures to combat the anæmia and weakness consequent on prolonged illness, chiefly by milk, iron and arsenic. He believes that the facts put now on record will, if followed as guides to diagnosis, enable the disease to be detected in the earliest stages, when it may be rapidly cured; the reason why "Surra" has hitherto been so uniformly fatal he believes to be simply because its real nature was not apprehended, and the disease allowed to run on till the vital powers were sapped by the constantly recurring fever.

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* Ranking George, M.D.—A preliminary note on the nature and pathology of the disease known as "Surra" affecting horses and mules in India. Indian Medical Gazette, June 1st, 1891.

* Giles investigated several cases which occurred at the latter end of an outbreak in Shillong, which from first to last resulted in the loss of between sixty to seventy animals.

The disease described by this observer was certainly not 'Surra,' but was due to the presence of the *sclerostomum tetracanthum.* As early as 1865, Franck and Fischer working independently published papers dealing with the anæmia, hæmorrhagic enteritis, and fatal colics produced by these nematodes.

Lieutenant J. Baldwin, R.A., has given the following information *re* Surra in Burmah.

A section of No. 6 Bombay Mountain Battery left Bhamo in January 1891, and took part in the Wuntha expedition. [Wuntha is noted for the prevalence of Surra.] No deaths occurred during the expedition and the section returned to Bhamo at the beginning of April. In May several of those animals which had had the hardest work during the expedition, *i. e.* the baggage mules, suffered for two or three days from high fever. They apparently recovered but fell off slightly in condition. In June they had another attack of greater severity. In July the same thing occurred, the animals becoming greatly debilitated. During this month the attacks came on once a week, and this continued through August; all the symptoms clearly indicated Surra.

In September four of the mules died, in October six, and in November five. This left only seven out of the original twenty-two baggage mules; of these seven mules, three had suffered from intermittent attacks of fever, and four appeared to be quite healthy. These seven mules started on another expedition in December 1891, and seemed at first to be picking up and doing well; however in January 1892, two of them were again attacked with disease in so virulent a form, that in the space of a week they were unable to stand, and had to be destroyed. The third mule had to be destroyed on the 1st April 1892; the remaining four mules were never sick, and are still working.

It will be seen from the above that "supposing the disease to have been contracted in Wuntha, which appears probable, as no other animals were attacked in Bhamo," the disease in one case lasted at least a year before a fatal termination.

On the expedition above referred to, which started in December 1891, the number of animals exceeded 400; there were among these only two other fatal cases, one from tetanus, the other from an accident.

The same officer also states, that from August 1890 to August 1891 the Chinese traders brought 6,500 mules to Bhamo from Yunnan. Fifteen hundred of these animals died of Surra in Burmah, and five thousand were left to make the return journey. On the return of the traders to Bhamo in the following year, and on their being questioned as to the condition of the animals which made the journey in the previous year to Yunnan, it was elicited that all of the animals, 5,000 in number, succumbed to disease either whilst on the march, or on their arrival in Chinese territory.

The traders further stated, that all mules brought by them from Yunnan on their last journey were entirely fresh animals, which had not been over the same ground in a previous expedition.

† G. H. Evans, in reply to certain queries, informed Mr. Pease that "the popular idea regarding immunity of the indigenous ponies in Burmah is a fallacy, as they die equally with other breeds, as also do the Panthé mules which are bred in the Northern and Chinese Shan States; so much so is this the case, that hardly a mule or pony escapes in the Upper Irrawaddy, Mogaung, and Myitchna, so that all hope in the direction of naturally acquired immunity in indigenous breeds is lost."

"There is a form of bilious fever here exactly resembling many cases which we have had in the Poona Laboratory—Yellowness of the visible mucous mem-

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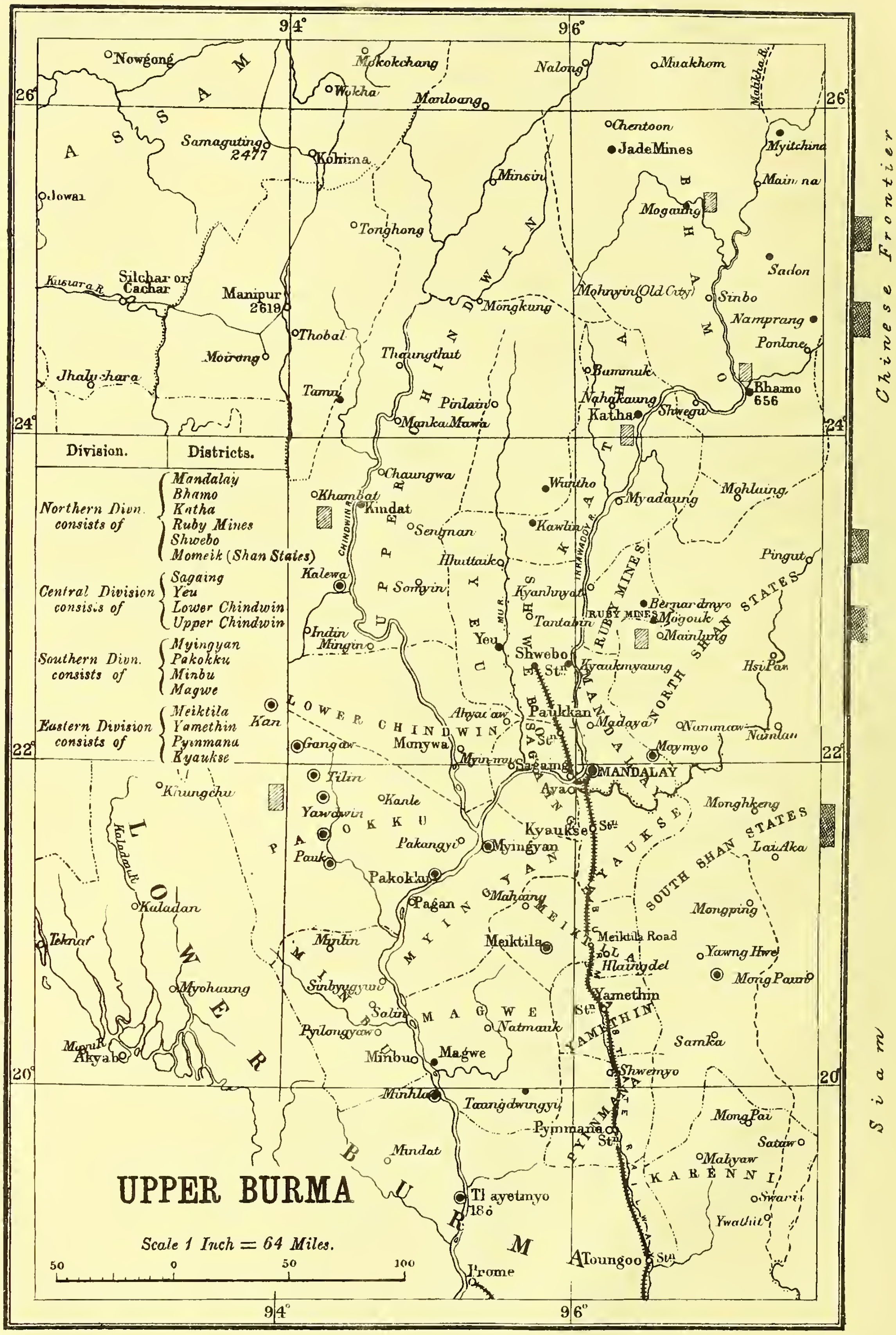
* Giles, G. M. J., Surgeon, Lawrence Military Asylum, Sanawár.

"Some observations on the life history of sclerostomum tetracanthum (Diesing), and on sclerostomiasis in equine animals, in connection with a so-called outbreak of 'Surra' at Shillong.—Scientific Memoirs, M. O. I. Army, Part VII, 1892.

† Veterinary-Lieutenant, Superintendent, C. V. D., Burmah.

REFERENCES.

- ◉ Personally observed Surra Cases.
- ● Surra Cases stated on good Authority
- ▨ Surra exists to a great extent at times.
- ▩ Where large numbers of animals are stated to die annually.



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Photozincographed from a Lithograph
Govt Photozinco: Office, Poona, 1893

branes, and petechiæ on the conjunctivæ, with rapid loss of condition and occurrence of relapses; and this is no doubt very frequently confounded with Surra. Evans has often been asked to destroy cases of this description, but from the experience gained in an outbreak in 1890, he was led to discard all other symptoms as a proof of the existence of Surra, and base his diagnosis solely on the presence of the hæmatozoon in the blood."

"In *post mortem* examinations of Surra-subjects, ulcers in various stages are present in the majority of cases, shallow, deep, or small as the case may be. They present the appearance, which may perhaps be conveyed best by the effect produced by a cockroach eating the surface of a patent leather boot."

"Spiroptera nests are by no means invariably found in the stomach; in fact they appear to be much rarer in Burmah than in the Bombay Presidency."

The Panthés, who are great mule-breeders across our Frontiers, state that Surra kills a great number of their mules every season, in the valleys between the Frontier and Yunnan. The same people also state that Surra prevails in certain parts of the North and South Shan States.

In Burmah the stations where the greatest mortality has occurred are as follows:—Mogaung, Bhamo, Mogok, Katha and the Upper Chindwin.

In Lower Burmah a few cases only have been observed, viz., in Rangoon, Prome and Thayetmyo.

The accompanying map received from Veterinary Lieutenant G. H. Evans shows that Surra is pretty general throughout Upper Burmah.

Mr. Rimington, Managing Director of the Bombay Tramway Company, kindly supplied me in August 1892, with the attached statement, giving particulars of 14 horses belonging to the stud of the Bombay Tramway Company, which were attacked with Surra fever in the months of November and December 1888.

Locality and description of the stables.—It will be observed that of the 14 cases of Surra, 10 cases have come from the Company's *Parel* Stables. These stables were constructed in 1886, with accommodation for 174 horses, and this was the actual number kept there during the two months, when the outbreak prevailed. The stables are situated on the Parel Road in the northern and most inland quarter of Bombay. They are bounded on the north by an enclosure about 5,000 square yards in area, which is used as a vegetable market, and skirted on 3 sides by lines of brick-built chawls; on the south by an open space reserved for the purposes of a proposed new station by the G. I. P. Railway Company; on the east by the Parel Road, on the other side of which are the Victoria Gardens; and on the west by the G. I. P. Railway track, beyond which again for some distance there is open land. About 2,000 feet from the stables the flats commence: open, low-lying vacant land which extends for several miles, and the greater portion of which is under water during the monsoon. For the two and a half years the stables have been in use, there has, up to last November, hardly been a single case of fever in them. The stables are splendidly ventilated, and the drainage is on the surface system, and could not be better. The stalls and all the stable fittings are kept most scrupulously clean, and bad smells are unknown. The temperature at Parel generally ranges 2° lower than at Colába, especially at night. The *Colába Stables* are situated in the Colába Causeway. To the north is a large piece of *maidán*, belonging to Government, sometimes submerged during the monsoon for a few days at a time; to the south are goods stations and yards belonging to the two Railway Companies; to the east the Colába Causeway road, with the sea about 600 feet beyond; to the west open *maidán* with the sea distant about 1,000 feet. The average number of horses stabled at Colába during November and December was 574. The drainage of the stable is inferior to that at Parel, being on an under-ground system. Great care, however, is taken in flushing the drains, and keeping the premises scrupulously clean. The ventilation of the stables is good. Fever has often been prevalent in these stables in October and November, but the number of fatal cases has been few, and the disease has usually disappeared as soon as the cold weather set in.

To sum up the number of horses kept at *Parel* is less than one-third of that kept at *Colába*; the interior sanitary arrangements at the former are superior to those at the latter; the record of fever cases at the former has up to November last compared most favourably with that at the latter; the temperature at the former averages 2° lower than at the latter. Notwithstanding all these facts to the credit of Parel, 10 horses have been attacked there during the recent outbreak of Surra against 4 horses attacked at Colába stables.

Feed and water-supply.—(*a*) *Feed.*—The Company's horses get from 12 lbs. to 15 lbs. grain per day according to size. The majority of the horses attacked with Surra fever were horses receiving 15 lbs. grain feed. The feed in question was composed of a mixture of 8 parts, viz., 3 parts gram, 3 parts barley, 1 part kulti (boiled), and 1 part Indian-corn. Their hay feed was 12 lbs. per diem. The hay is grown on black soil in Gujarát. Like all Indian hay it is jungle hay, not raised on drained land. The grasses we prefer and chiefly employ for hay are Mosi, Daroia, and Zinjva (known in the Deccan as "Sheera"). From August to middle of October, in accordance with our custom for many years past, the horses received from 2 lbs. to 4 lbs. green grass daily, grown in the neighbourhood of Bombay. They also receive daily 1 lb. bran and 1½ oz. salt.

(*b*) *Water.*—The water used in the stables and everywhere on our lines is all from the Municipal reservoirs at Vehár and Tulsi; Colába stable is supplied with Tulsi Water, and Parel stable with Vehár water. We had the water used at the latter stable, and at the watering stations on the line near there, analysed by the Government Analyst, Dr. Lyon. The following is his report upon it:—

Statement showing the results obtained on examination of four samples of water forwarded December 18th, 1888, by the Superintendent, Parel Stables, Bombay Tramway Company.

"Samples labelled:—
No. 1 Parel Terminus.
No. 2 Parel Stable.
No. 3 Byculla Bridge, N. side.
No. 4 Byculla Bridge, S. side.

	1	2	3	4
Grains per gallon.				
Total solids	7·70	8·40	6·30	4·20
Chlorine	·91	·91	·84	·84
Parts per million.				
Free ammonia	·04	·02	·02	·02
Albumenoid ammonia	·19	·18	·21	·17

"*Sediments.*—In all scanty, chiefly vegetable débris.

"A few paramonia in No. 1.

"From these results all four appear to be samples of water very similar in quality to the ordinary Vehár supply of Bombay. The Albumenoid Ammonia results are perhaps very slightly higher, indicating slightly more organic contamination. Were the case one of an outbreak of fever among human beings, I should say that it was very improbable that any connection existed between the outbreak and the water-supply."

Climatic conditions last year (*1888*).—The monsoon last year was an unusually light one, the aggregate rainfall being 59 inches, against an average of 75 inches. In September scarcely any rain fell, the total fall registered that month amounting to 3½ inches only. There was no rain in October, and the temperature, which throughout the month was unusually high, touched a maximum of 93° in the shade. Early in October portions of the city were visited with a mosquito plague. The innumerable quantity of those insects in the air indicated something unusual in the climatic conditions, or in the condition of the marshes which skirt Bombay. The weather commenced to get cooler in November, and in the middle of December cold north-east and north-west winds set in, and have since continued, the former blowing during the night, and the latter during the day.

Breed of the Horses attacked.—The Company had last October a stud of 739 horses; of these 570 were Australians, and 169 horses of Asiatic breeds. Of the 14 horses attacked with "Surra" in November and December, 13 were Australians, and one was a Persian. The majority were young horses, well-bred, and in excellent condition.

Preventive measures adopted.—As soon as we were satisfied that "Surra" had appeared amongst our horses, and that the causes producing it seemed in especial force at our Parel stables, we carried out a most careful and thorough examination of the watering and drainage arrangements at that stable. The results of the examination of the water have been given above. The stable drainage was found in good order, no stoppage anywhere; all drains clean and free from smell. A drain in the neighbouring property to the north was, we found, not working well, and we had it attended to. We disinfected the stables throughout on more than one occasion with phenyle and water, 1 part to 50, sending showers of it through the air in every direction from a manual fire engine, and thoroughly drenching the roof and stable fittings. Carbolic powder was also sprinkled in all the stalls, and sulphur and tar burnt in braziers in the passage ways. We noticed that the majority of the horses attacked had been standing in portions of the stable most exposed to the north-west and north-east winds, and that it was since those winds had turned cold in the evening and at night, that the outbreak of "Surra" had occurred. With a view to obtaining thorough ventilation in the hot weather, our stables at Parel are very open in their construction, and although the venetians, with which the sides are fitted, are closed at night, it occurred to us that at certain places the horses were more exposed than they should be to the night winds. To provide against this, we effectually protected the horses from all apertures whence these winds could enter and blow upon them, and considerably increased the warmth of the stables at night by the erection of bamboo and matting screens across the principal entrances. We also gave all the horses standing at Parel a light course of antiseptic medicine. For three days each horse had daily two drachms Hyposulphite of Soda and one drachm Nitrate of Potash mixed with his evening grain feed. These preventive measures were carried out the latter part of December. It was during the last week of that month that we set up the screens, &c., which effectually protected the horses at Parel from cold winds. Simultaneously we introduced stringent regulations at Colába for the complete protection of the horses there, and maintenance of a more even temperature in the stables at night. Since the 1st January we have so far had no fresh case of Surra.

Possible causes of the outbreak.—The professional opinion as to the source of "Surra" expressed by the Government Veterinary Officers, Mr. Burke, Mr. Evans, and Mr. Steele, in their Treatises on this disease, is that the parasites which give rise to it enter the horse's system either with his food or his water. In the Company's stables, the water-supply, pronounced a pure and wholesome one by the Government Analyst, is the same as has been in use for several years past, and no alteration has been introduced into the character of the grain and hay feed. The drainage of the Parel stable, where two-thirds of the "Surra" cases occurred, is exceptionally good, much better than the drainage at Colába stable. Immediately to the rear of the stables at Parel, there is a depôt for manure. The dung both from Colába and Parel is transported there. Thence it is daily removed by carts. A portion of it remains there throughout the night, but none of it remains there longer than the morning subsequent to the day of its receipt. At our old stables at Byculla a similar depôt existed, but the manure remained there for three days before removal. At neither stable has the existence of this depôt heretofore been a cause of unhealthiness. The fever record of the Parel stables for the two years of their existence prior to last autumn has been an extremely satisfactory one, very much more favourable than the record at Colába. We cannot, therefore, find anything in the feeding of the horses, their watering, or the drainage of their stables which would account for the outbreak. All these conditions, in so far as they affect the horses' health, have been, to the best of our belief, precisely the same these last four months, as during the many past years when "Surra" was unknown to us. We, therefore, seem directed to seek in some special climatic and atmospheric conditions for the explanation of the outbreak. October and November last were notoriously exceptionally unhealthy months in Bombay. Malarial and typhoid fevers were prevalent, and many cases ended fatally. Unusually unhealthy months for human beings, they would appear to have been unusually unhealthy for horses also. The outbreak of "Surra" fever was not confined to the Company's stables. Several horses attacked with it were sent to the Government Veterinary Hospital, and others to the private veterinary establishments in the city. Probably, a far larger number died in their owners' stables. Amongst the cases observed we have not heard of a single recovery. Taking all the above facts into consideration, the opinion we have been led to form is that there was some specially unhealthy influence in the atmospheric conditions this last autumn, which predisposed horses to this particular blood-poisoning fever, and that the specific cause which developed the disease into activity in the horses attacked with it, was getting chilled from exposure to the cold northerly winds, which during the latter half of November and the month of December blew in the evening and at night. This is the conclusion to which we have been led as the result of our own experience of the disease. In support of this opinion we have the following facts :—(1) That the horses attacked were found to have been especially exposed to cold night winds by their position in the stables, or nature of their work. At Parel stables, where the majority of cases occurred, alterations in the buildings were in progress. The south wall of the stable had been taken down in order to increase the number of stalls in that direction. This open condition of the premises on that side, while it did not expose the horses to any unwholesome wind (the south wind only blowing in the monsoon time, and being a warm one) tended, no doubt, to increase the draught through the stables from the north, and to lower their temperature at night. (2) That since the time when we introduced measures for protecting the stables from the northerly winds (a period of five weeks), no fresh case of "Surra" has occurred. The last case at Parel stables appeared on the 29th December. It was on the 30th of that month that we completed the arrangements for excluding cold winds. (3) That the Parel stables, where nearly three-fourths of the cases occurred, were, until recently, in consequence of their system of construction, more open and considerably colder than the stables at Colába. (4) That there is nothing ascertainable in the feeding or watering of the horses, differing from the feeding or watering during previous years when Surra was unknown to us, or which can, in our opinion, in any way account for the outbreak.

In connection with the exposure of the horses to cold winds and our opinion that the chill to the system therefrom resulting was the immediate factor producing actively in the disease, we may mention that out of 8 horses working as "helping" horses on the Byculla bridge, no less than 3 were attacked with "Surra," and of these two were attacked upon the same day. Compared with the work most of our horses do, the work of these particular horses was light, and they were in specially good condition and of exceptionally fine physique. These horses are attached as additional horses to help in pulling cars up the inclines on the bridge. After pulling up a car they return to the little waiting-sheds provided for them at either end of the bridge, and stand usually about five minutes, until another car approaches. On examining these sheds, we found them a good deal exposed to the north wind. We have now protected them ; but it is easy to understand how in the early morning, or between 7 P.M. and 11 P.M. at night, these horses after getting warm at their work would be specially liable to chill when standing waiting in sheds, until recently not very well protected from cold winds.

In the plains of America it has been noticed that in certain thinly populated districts where fever was prevalent, the introduction of railway tracks and the passage of trains has modified the sanitary conditions. The theory in explanation of this fact is that the displacement of air caused by the rapid passage of the train creates a vacuum and consequent draught, and that a rush of fresh air is, in this way, introduced. In other words, the train produces a sort of artificial wind. The track of the G. I. P. Railway passes immediately behind our Parel premises, distant only 75 feet from the stables. About 2,000 feet further to the north the flats commence and are crossed by the trains. In this memorandum we are anxious to enumerate all possible influences which may have served in the production of the recent outbreak of Surra. It is perhaps worthy of consideration whether the G. I. P. Railway track, which very shortly after leaving the marshy land of the flats passes our Parel stables on their north-western side, does not act as an air-channel from the one to the other. The line of horses standing next to the railway was the line in which the "Surra" was by far the most prevalent.

A conjecture has been put forward by some veterinary authorities in India that there is a connection between "Surra" and rats. A parasite has been found in the intestines of rats, which is similar to the parasite noticed in the blood of horses suffering from Surra. It is suggested that where rats have access to grain, it becomes contaminated with their excreta, and that when used for horses' feed, the parasite may in that way be conveyed into the horses' stomachs. In view of this theory we think it right to mention that although the greater portion of our grain is kept in paved godowns, and we do our best to exclude rats, yet, we know that both before and after the grain is received by us rats do frequently get at it. But before our grain is used for horses' feed, it is carefully cleaned both by hand and through a machine. We ourselves cannot, from our own observation, favour the rat infection theory. If the source of the disease is due to grain getting mixed with the excreta of rats, why is the appearance of the fever limited to certain seasons and why should it appear only in certain years. For the past 14 years it has been unknown in our stables and during those years our stocks of grain and hay have been less well-protected from the incursions of rats than they have been the past 12 months.

We have now, we think, exhausted all we are in a position to state with regard to our own experience of "Surra" fever. We submit these few remarks on a veterinary subject as proceeding of course from a non-professional pen, and while we trust to be pardoned any mistakes into which we may in consequence have fallen, we hope that our experience may be of value to those who are making this disease a subject of special study. As a large owner of horses this Company is deeply interested in researches which have for their object the discovery of a remedy for this most fatal form of equine fever.

The following charts give full details regarding the animals attacked in the Bombay Tramway Company's Stables during the years 1888-1892 inclusive, and from them the charts have been drawn up:—

1888.

No.	Breed.	Sex.	Age.	Date of purchase.			Date of attack.			Date of death.			Time elapsing between purchase and attack.		Time elapsing between attack and death.	Remark.
				D.	m.	y.	D.	m.	y.	D.	m.	y.	Yrs.	days.		
366	Australian	Gelding	16	1	5	79	18	10	88	3	11	88	9	170	16 days.	
472	Do.	Mare	11	28	1	83	21	10	88	4	12	88	5	267	44 ,,	
496	Do.	Gelding	8	23	11	86	31	10	88	20	11	88	1	343	26 ,,	
182	Do.	Do.	11	21	2	83	6	11	88	2	12	88	5	259	26 ,,	
604	Do.	Do.	8	1	1	86	12	11	88	25	11	88	2	316	13 ,,	
511	Do.	Mare	11	14	1	84	18	11	88	21	11	88	4	309	3 ,,	
356	Persian	Gelding	11	30	10	84	19	11	88	10	1	89	4	20	52 ,,	
230	Australian	Do.	11	28	1	83	11	12	88	15	12	88	5	318	4 ,,	
93	Do.	Do.	11	14	1	84	16	12	88	14	1	89	4	337	29 ,,	
403	Do.	Mare	9	22	11	86	16	11	88	4	12	88	2	24	18 ,,	
196	Do.	Do.	6	13	2	88	17	12	88	16	1	89	0	308	30 ,,	Destroyed.
373	Do.	Gelding	16	15	5	79	17	12	88	22	12	88	9	217	5 ,,	
480	Do.	Mare	12	28	1	83	23	12	88	13	1	89	5	330	21 ,,	Destroyed.
323	Do.	Gelding	8	29	12	84	29	12	88	16	1	89	4	0	18 ,,	Do.

1889.

No.	Breed.	Sex.	Age.	Date of purchase.	Date of attack.	Date of death.	Time elapsing between purchase and attack.	Time elapsing between attack and death.	REMARK.
				D. m. y.	D. m. y.	D. m. y.	Yrs. days.		
256	Australian	Gelding	6	18 10 88	16 10 89	20 12 89	0 363	65 days.	
131	Do.	Do.	12	20 10 88	13 10 89	18 11 89	0 358	36 ,,	
314	Do.	Mare	6	22 9 88	14 10 89	29 11 89	1 22	46 ,,	
240	Do.	Gelding	6	15 2 88	24 9 89	6 11 89	1 222	43 ,,	
228	Do.	Mare	12	28 1 83	24 10 89	6 11 89	6 269	13 ,,	
786	Do.	Gelding	5	19 12 88	14 9 89	3 11 89	0 269	50 ,,	
442	Do.	Do.	10	9 1 85	27 10 89	16 11 89	4 291	20 ,,	
624	Do.	Mare	9	11 1 86	19 10 89	14 11 89	3 281	26 ,,	
112	Do.	Do.	16	30 1 78	2 11 89	21 11 89	11 276	19 ,,	
441	Do.	Gelding	6	11 12 88	6 11 89	15 12 89	0 330	39 ,,	
397	Do.	Do.	7	11 12 88	14 11 89	28 11 89	0 338	14 ,,	
815	Do.	Do.	8	22 12 88	13 11 89	26 11 89	0 326	13 ,,	
730	Do.	Do.	6	27 9 88	22 11 89	22 12 89	1 55	31 ,,	
27	Persian	Do.	11	28 10 85	27 11 89	27 12 89	4 30	30 ,,	
122	Do.	Do.	11	15 10 84	13 11 89	17 1 90	5 29	65 ,,	
74	Country bred	Do.	11	18 9 85	30 11 89	30 12 89	4 73	30 ,,	
542	Persian	Do.	10	1 1 86	26 11 89	28 12 89	3 329	32 ,,	
458	Australian	Mare	15	7 2 82	28 11 89	11 2 90	7 294	75 ,,	
517	Arab	Gelding	11	6 5 85	3 12 89	27 1 90	4 211	55 ,,	
467	Country bred	Do.	7	19 3 88	3 12 89	7 1 90	1 259	35 ,,	
305	Cabuli	Do.	22	7 1 76	4 12 89	7 1 90	13 331	34 ,,	
182	Australian	Do.	7	11 12 88	29 11 89	18 1 90	0 353	50 ,,	
571	Do.	Mare	9	1 1 86	23 9 89	22 10 89	3 265	29 ,,	
348	Do.	Gelding	15	10 6 78	24 10 89	26 10 89	11 136	2 ,,	Destroyed.
114	Do.	Do.	19	30 6 78	28 10 89	21 11 89	11 120	24 ,,	
51	Do.	Do.	15	3 9 79	29 10 89	14 11 89	10 56	16 ,,	
72	Do.	Do.	14	19 11 78	29 10 89	29 10 89	10 345	... ,,	Handed over to some one.
221	Do.	Do.	9	22 11 86	13 11 89	20 11 89	2 356	7 ,,	
519	Do.	Do.	11	14 1 84	14 11 89	2 12 89	5 304	18 ,,	
501	Do.	Do.	11	4 8 83	13 11 89	1 12 89	6 101	18 ,,	
482	Do.	Mare	12	21 2 83	14 11 89	30 12 89	6 266	46 ,,	
363	Do.	Gelding	18	20 3 79	15 11 89	18 12 89	10 240	33 ,,	
235	Do.	Mare	6½	13 2 88	17 11 89	20 11 89	1 278	3 ,,	
121	Do.	Gelding	13	14 1 84	19 11 89	19 12 89	5 310	30 ,,	
339	Do.	Do.	12	14 5 84	25 11 89	8 12 89	5 195	13 ,,	
796	Do.	Mare	6	22 12 88	28 11 89	27 12 89	0 341	29 ,,	
651	Do.	Gelding	10	26 11 86	30 11 89	18 1 90	3 4	49 ,,	
682	Do.	Do.	9	30 11 86	25 11 89	2 1 90	2 360	38 ,,	
401	Do.	Do.	12	9 1 85	5 12 89	22 12 89	4 330	17 ,,	
264	Do.	Mare	12	28 1 83	25 11 89	6 12 89	6 301	11 ,,	
299	Do.	Do.	15	8 1 79	28 11 89	11 12 89	10 324	13 ,,	
374	Do.	Gelding	19	5 6 79	7 12 89	19 12 89	10 185	12 ,,	
572	Do.	Mare	10	1 1 86	7 12 89	25 12 89	3 341	18 ,,	
186	Cabuli	Do.	16	26 12 78	9 12 89	27 12 89	10 348	18 ,,	
59	Australian	Gelding	15	19 11 78	12 12 89	16 1 90	11 23	35 ,,	
116	Do.	Do.	20	6 5 76	15 12 89	12 2 90	13 223	59 ,,	
173	Do.	Do.	9	20 11 86	23 12 89	12 2 90	3 33	51 ,,	

1890.

No.	Breed.	Sex.	Age.	Date of purchase.	Date of attack.	Date of death.	Time elapsing between purchase and attack.	Time elapsing between attack and death.	REMARKS.
				D. m. y.	D. m. y.	D. m. y.	Yrs. dys.		
643	Australian	Gelding	9	25 11 86	6 10 90	6 10 90	3 315	......	Destroyed.
509	Do.	Mare	6	27 1 90	12 10 90	12 10 90	0 259	......	Do.

1891.

No.	Breed.	Sex.	Age.	Date of purchase.	Date of attack.	Date of death.	Time elapsing between purchase and attack.	Time elapsing between attack and death.	REMARKS.
				D. m. y.	D. m. y.	D. m. y.	Yrs. days.		
533	Australian	Gelding ...	8	10 4 88	13 9 91	13 9 91	3 156	......	Destroyed.

1892.

No.	Breed.	Sex.	Age.	Date of purchase.	Date of attack.	Date of death.	Time elapsing between purchase and attack.	Time elapsing between attack and death.	REMARKS.
				D. m. y.	D. m. y.	D. m. y.	Yrs. days.		
491	Australian	Gelding ...	7	27 11 91	12 9 92	12 9 92	0 290	......	Destroyed.
504	Do.	Do. ...	14	14 1 84	12 9 92	12 9 92	8 243	......	Do.
73	Do.	Do. ...	19	31 1 80	14 9 92	14 9 92	12 228	......	Do.
747	Do.	Do. ...	9	8 10 88	23 9 92	19 10 92	3 351	26 days.	Sent to Dr. Lingard.
403	Do.	Mare	7	31 12 90	23 9 92	27 10 92	1 267	34 ,,	Do.
451	Do.	Gelding ...	7	25 11 91	7 10 92	21 11 92	0 317	45 ,,	Do.
285	Do.	Do. ..	7	17 4 92	30 10 92	17 1 93	0 196	110 ,,	Do.
462	Arab	Do. ...	14	0 0 88	7 11 92	15 12 92	......	38 ,,	Do.
328	Australian	Do. ...	11	8 10 88	25 11 92	4 1 93	4 48	40 ,,	Do.
325	Persian	Do. ...	13	26 11 86	27 11 92	31 1 93	5 1	65 ,,	Do.
448	Australian	Mare	9	23 1 90	6 12 92	18 12 92	2 318	12 ,,	Do.
390	Do.	Gelding ...	12	22 11 86	6 12 92	22 12 92	6 14	16 ,,	Do.
37[illegible]	Do.	Mare	11	22 11 86	10 12 92	25 1 93	6 18	46 ,,	Do.
197	Heráti	Do. ...	9	6 3 89	18 12 92	28 1 93	3 287	41 ,,	Do.
808	Australian	Do. ...	8	22 12 88	18 12 92	26 2 93	3 362	70 ,,	Do.

Meteorological Charts of the City of Bombay, showing the climatic conditions from the years 1888-92 inclusive, during which the previous Surra cases occurred.

1888.

Month.	Barometer reduced to 32°.	Temperature of Air.		Temperature of Radiation.		Temperature of Evaporation.		Computed Vapour Tension.	Relative Humidity.	Rainfall.
	Mean.	Mean. Maximum.	Mean. Minimum.	Hours Sunshine.	In Sun.	Mean.	Minimum.	Mean° F.	Mean° F.	Inches.
January	29·974	81·0	68·8	272·2	130·9	68·5	64·9	·613	73	1·85
February	29·951	83·0	70·1	300·1	139.0	69·8	67·8	·639	72	0·02
March	29·890	86·8	75·0	304·1	141·2	74·2	70·7	·760	74	0·10
April	29·812	88·9	78·2	301·3	145·0	76·6	73·7	·826	74	0·00
May	29·760	90·0	80·3	308·2	147·8	77·9	75·4	·860	73	0·00
June	29·667	87·4	79·7	163·3	139·6	79·0	76·4	·931	83	15·76
July	29·686	84·6	77·8	42·5	128·2	78·0	75·2	·910	85	12·47
August	29·721	83·5	76·6	40·2	133·6	76·6	74·2	·868	86	11·43
September ...	29·831	85·8	77·2	185·4	143·2	76·8	74·4	·855	81	4·92
October	29·866	90·1	77·3	287·3	144·5	76·8	73·0	·827	73	0·11
November ...	29·884	88·2	75·4	246·6	141·0	74·1	70·0	·747	71	1·16
December... ...	29·960	86·0	71·3	290·4	139·2	69·5	64·9	·612	66	0·00

1889.

Month.	Barometer reduced to 32°.	Temperature of Air.		Temperature of Radiation.		Temperature of Evaporation.		Computed Vapour Tension.	Relative Humidity.	Rainfall.
	Mean.	Mean.		Hours Sunshine.	In Sun.	Mean.	Minimum.	Mean° F.	Mean° F.	Inches.
		Maximum.	Minimum.							
January	29·970	83·6	68·9	303·4	137·3	68·8	63·6	·605	69	0·00
February	29·967	83·7	69 3	...	138·7	69·0	63·5	·607	69	0·00
March	29·923	86·1	73·8	..	140·5	73·1	69·0	·719	72	0·00
April	29·811	88·2	77·3	...	143·6	76·5	73·2	·825	76	0·00
May	29·782	91·6	81·3	...	145·8	79·7	76·7	·924	75	0·67
June	29·669	87·7	80·0	...	135·9	79 3	76·3	·940	83	19·89
July	29·649	84·8	77·9	...	129·6	78·1	75·5	·918	86	30·45
August	29·702	84·9	77·9	...	133·5	77·6	75·1	.892	84	10·32
September ...	29·744	87·1	78·2	...	142·8	78·9	75·6	·899	83	2·71
October	29·801	86·5	75·5	...	139·6	75·6	72·4	·821	80	3·80
November... ...	29·883	84·9	69·8	...	137·7	69-9	65·2	·637	71	0·00
December... ...	29·929	84·3	68·4	...	136·5	68·2	63·2	·589	69	0·00

1890.

Month.	Barometer reduced to 32.°	Temperature of Air.		Temperature of Radiation.	Temperature of Evaporation.		Computed Vapour Tension.	Relative Humidity.	Rainfall.
	Mean.	Mean.		Temperature in Sun.	Mean.	Minimum.	Mean° F.	Mean° F.	Inches.
		Maximum.	Minimum.						
January	29·910	84·7	68·6	136·4	67·9	62·9	·573	66	0·00
February	29·910	85·2	70·6	137·3	70·1	64 2	·624	67	0:00
March	29·843	85·8	74·3	139·7	72·7	70·1	·710	71	0·00
April	29·787	88·4	78·0	141·0	76·6	73·2	·824	75	0·01
May	29·757	89·7	80·0	143·2	77·8	75·0	·858	74	0·06
June	29·635	85.4	77·6	132·3	78·1	74·8	·911	85	24·55
July	29 669	83·4	76·2	127·2	76·7	74·0	·875	86	21·34
August	29·759	83·2	75·2	132·8	75·4	73·0	·825	84	10·61
September	29·785	84 3	76·2	136·9	75·5	73·4	·822	82	6·45
October	29·856	86.6	75·6	137·6	75·4	72·1	·805	78	0·58
November	29·918	85·7	73·3	134·0	72·2	68·8	·704	72	1·25
December	29·946	83·6	70·5	131·8	69·7	65·4	.625	70	0·13

1891.

Month.	Barometer reduced to 32°	Temperature of Air.		Temperature of Radiation.		Temperature of Evaporation.		Computed Vapour Tension.	Relative Humidity.	Rainfall.
	Mean.	Mean.		Temperature in Sun.		Mean.	Minimum.	Mean° F.	Mean° F.	Inches.
		Maximum.	Minimum.							
January	29·952	83·4	67·5	...	133·4	66·9	59·8	·555	66	0·00
February	29·941	82·3	66·9	...	133·1	66·4	60·1	·540	64	0·00
March	29·867	84·6	72·0	...	136·7	70·5	66·3	·634	67	0·20
April	29·836	87·2	76·5	...	140·2	75·6	72·2	·797	75	0·00
May	29·768	89·9	80·1	...	141·5	77·9	75·8	·864	75	0·00
June	29·737	90·5	81·6	...	140·0	79·2	77·1	·911	76	13·99
July	29·656	84·4	77·8	...	122·4	77·7	75·3	·905	86	32·48
August	29·751	84·7	77·6	...	131·3	77·0	74·9	·874	84	6·94
September ...	29·793	84·7	76·3	...	133·7	76·7	74·0	·866	85	22·53
October	29·858	88·8	76·4	...	138·4	75·9	72·7	·810	76	1·04
November ...	29·898	88·3	73·6	...	137·6	71·2	67·5	·646	65	0·00
December... ...	29·959	86·8	70·5	...	134·0	68·2	63·4	·568	62	0·00

1892.

Month.	Barometer reduced to 32°.	Temperature of Air.		Temperature of Radiation.		Temperature of Evaporation.		Computed Vapour Tension.	Relative Humidity.	Rainfall.
	Mean.	Mean.		Temperature in sun.		Mean.	Minimum.	Mean° F.	Mean° F.	Inches.
		Maximum.	Minimum.							
January	29·929	83·5	69·3	...	131·1	68·9	63·6	.606	68	0·00
February	29·863	84·8	71·6	...	134·2	70·0	65 2	·625	66	0·00
March	29·812	85·4	74·1	...	134·3	73·6	69·8	·747	75	0·00
April	29:761	90·5	81·0	...	140·0	78·7	76·0	·885	74	0·00
May	29·754	91·2	82·2	...	140·8	78·3	76·1	·857	70	0·11
June	29·660	86·3	78·9	...	140·3	78·7	76·0	·922	83	13·30
July	29·610	84·6	78·5	...	133·4	78·1	75·7	·913	85	23·86
August	29·694	82·3	76·2	...	127·2	76·6	74·5	·875	88	36·56
September ...	29·741	82·5	75·5	...	129·6	76·1	73·8	·857	87	18·73
October	29·796	87·0	77·0	...	138·3	77·4	74·2	·875	82	1·89
November ...	29·898	86·2	71·8	...	136·8	70·4	66·1	·640	67	0·67
December... ...	...	...	...	...	...	...	...	...	...	0·00

SECTION IV.

GEOGRAPHICAL RANGE.

The geographical range of this disease is much wider than it was once imagined, and is *one* of the most important diseases affecting equines met with in India. According to Evans, the natives of Dera Ismail Khan on the north-western frontier east of the Indus have known this disease for several generations as an occasional scourge. It has now been recognized all along the low country bordering the Indus. In the seventies at Asni near Rajanpore, one

Cavalry regiment (3rd P. C.) lost 350 horses. In the late war it caused enormous mortality among horses, mules and ponies used in Upper Burma, and according to Steele ninety-eight per cent. died from it, and Komree. Surra is endemic in the island of Bombay, and has been frequently recognized in animals in the low district lying below the western ghâts, called the Konkan, and less frequently in other parts of this vast continent, separated from each other by many hundreds of miles, viz., in the Berars, in Meerut, and other parts of the North-Western Provinces, as well as in Assam and Cachar. Blanchard recognized this disease in Tonquin among the transport mules belonging to the French Government. In 1876 a disease was pointed out to Haig in Persia, which he was told was invariably fatal, the cause of which the natives ascribed to the animal's drinking impure water. On Haig's return to India he became acquainted with Surra, and then recognized that the Persian animals were affected with all the outward symptoms of that disease. There are reasons for believing that animals have succumbed to this disease in Abyssinia, and probably also in Southern Europe, North America, Brazil, East Africa, and Australia.

SECTION V.

PRECIS OF CASES.

PART I.

Naturally contracted Surra Cases.

No. I.—A grey Arab horse, 7 years old, had been ill for 48 days. Disease advanced. *Fever* continued with remissions; lived two days under observation. Hæmatozoa swarming.

Autopsy.—Body emaciated, nasal mucous membrane thickened and congested. *Lungs* healthy, *liver* healthy, *spleen* enlarged, *stomach, cuticular* portion thickened, *villous* portion congested, several ecchymoses dotted over the surface of the mucous membrane. *Kidneys* pale, but appeared healthy.

No. II.—A Bay Arab gelding, 8 years old, had been ill for 43 days. Disease advanced on arrival at the Laboratory. Supposed to have contracted it from drinking the water from polluted wells. There was effusion of blood into the anterior chambers of both eyes, observed six days previous to death, and slight ulceration on the septum of the left nostril. *Fever* was continued with remissions. The animal lived six days under observation. The hæmatozoon was present in the blood during five days. Death occurred on the 49th day of the disease.

Autopsy.—Body emaciated, yellow coloured exudation lying under the skin in the sternal region. *Lungs.*—Pneumonic consolidation at the apex and anterior and outer borders of the right lung; the left free. Ecchymoses were dotted over the surface of the visceral pleuræ. *Liver*, the seat of an old peri-hepatitis. *Spleen* enlarged, and presented sub-capsular petechiæ. *Kidneys* pale in colour but appeared healthy. *Stomach* contracted, *cuticular* portion stained a yellow colour, ***villous*** portion thickened, and dotted over with a few ecchymoses.

No. III.—A brown Arab gelding, aged, history of sixteen days illness previous to its arrival at the Laboratory. An eruption of Urticaria appeared during the second and third week of the disease, and later an effusion of blood took place into the anterior chambers of both eyes causing total blindness. The *fever* was of the continued type accompanied by daily remissions and by intermissions of short duration at irregular intervals. The hæmatozoon was present off and on until death, which occurred on the fifty-seventh day of the disease.

Autopsy.—Body emaciated. Both corneæ opaque. *Lungs* presented localized patches of emphysema, *stomach, cuticular* portion healthy, *villous* portion the seat of congestion and the *Spiroptera megastoma.* *Spleen* much enlarged, dotted over with sub-capsular petechiæ. *Liver* the seat of numerous circumscribed, pearly white bodies, which had undergone calcification, dotted through the tissues and lying thickly scattered under Glisson's capsule. *Kidneys.* The capsules adherent in places, with a circular extravasation on the cortical portion, and on section found to dip into the structures of the right organ. Mesenteric *glands* considerably enlarged and very dark in colour. *Intestines* healthy in appearance.

No. X.—A country-bred mare, aged, the property of a Gádivála, brought from Bombay fifteen days previously to its admission to the Laboratory Hospital. Disease advanced. No authentic information as to the date of attack. *Fever* of the continued type with remissions. The animal lived two days under observation. The hæmatozoa were numerous in the blood.

Autopsy.—Body emaciated, absolutely free from subcutaneous œdema. *Lungs*, localized areas of emphysema in the right, together with a thickened condition of the pleuræ and a wedge-shaped portion, semi-solid in structure. A small quantity of fluid in the cavity of the pericardium. *Heart.*—No sub-pericardial or sub-endocardial extravasations present. *Stomach*, healthy. *Liver*, calcareous bodies present. *Spleen*, enlarged, sub-capsular petechiæ present. *Kidneys*, normal in appearance, as also the other organs. The chief points of interest in this case were the presence of a horse suffering from naturally contracted Surra on the Deccan plateau, and the discovery of its previous Bombay history. The rapidity with which the disease advanced, owing to the animal's having been worked in a vehicle plying for hire, and lastly the slight pathological lesions found after death.

No. LVI.—A grey Arab entire, aged; admitted 23rd December 1891 in Bombay Veterinary College Hospital with a history of fever of one month's duration. Lived under observation at the Laboratory for four days. Hæmatozoa swarming in the blood. The *fever* was of the continued type with remissions, but the temperature gradually fell and became subnormal in the morning, but rose 3·5°C at night.

Autopsy.—Body emaciated, membranes yellow. *Lungs*, the seat of localized emphysema, extravasations under the pleuræ. *Heart*, extensive sub-pericardial extravasations, also numerous sub-endocardial extravasations in the left ventricle, chiefly involving the musculi-papillares. *Stomach*, *cuticular* portion healthy, *villous* portion presented a *Spiroptera Megastoma* tumor. *Liver*, signs of old perihepatitis. *Spleen* enlarged. *Kidneys*, right capsule adherent in places, congested. *Small intestines*, few ecchymoses dotted over the mucous membrane, no ulceration. *Large intestines* healthy. *Bladder* healthy.

No. LXV.—Australian Roan mare, aged; admitted 12th June 1892, with a history of having drunk water from polluted wells between 17th March and 14th April 1892. The first symptom noted, consisted of a general eruption of Urticaria on the 23rd of May 1892. *Fever.*—The animal was under observation for a period of sixty-eight days, during which time the fever was of the continued type, with slight daily remissions interrupted on one occasion only, the fifty-fifth day, by a short intermission. *Treatment.*—This animal was submitted to a treatment consisting of mixed Cinchona Alkaloids, and Arsenic. The hæmatozoon which had previously been present in the blood from the twenty-first to the twenty-eighth day of the disease, disappeared from the blood under treatment and remained absent until the fifty-sixth day; the treatment having been relinquished on the evening of the forty-eighth day in consequence of the condition of the animal. On the re-appearance of the organism in the blood the treatment was re-established, and the blood four days later, for the second time, became free from the hæmatozoon for a period of nine days, between the fifty-ninth and sixty-eighth day of the disease; on which latter date the mare succumbed.

Autopsy.—The body was somewhat emaciated, no œdema of the extremities. *Thorax*, no fluid in the pleural cavities and no pleuritic adhesions. *Lungs*, no sub-pleural extravasations; both apices were the seat of atelectasis. The tissues presented a healthy appearance. *Pericardial* sac contained 60 c.c. of an orange coloured fluid. *Heart* fairly healthy; no sub-endocardial extravasations. *Liver*, localized thickening and opacity of Glisson's capsule; tissue appeared healthy. *Spleen* healthy. *Kidneys* healthy. *Stomach* presented a patch, pink in colour, involving the *cuticular* portion; no ulceration. *Small and large intestines.*—The former was the seat of a few petechiated patches, no ulceration; the latter presented a healthy appearance. *Brain*, increased amount of cerebro-spinal fluid—75 c.c.

No. LXX.—A grey Australian gelding, aged, taken ill on 17th September, 1892; the disease recognized as Surra on 23rd September and it was admitted on the 24th of September, in good condition but suffering from the ordinary symptoms of fever. The hæmatozoon was however present in the blood. The *fever* during a period of twenty-seven days, whilst under observation, was of the continued type, accompanied by remissions, but with no intermission. *Treatment.*—This animal was subjected to a treatment of Carbolic Acid and Iodine in large doses from the 3rd to the 8th day of the disease inclusive, and at a later date from the 12th until the morning of the 27th day of the disease with mixed Cinchona Alkaloids and Arsenic in increasing doses. Death occurred on the 27th day of the disease.

Autopsy.—Body emaciated, extremities swollen and œdematous, yellow exudation lying subcutaneously in the sternal region. *Lungs.*—Apices, the seat of a localized emphysema. *Pericardial sac* contained 6 ozs. of a turbid, orange-coloured fluid. *Heart*, sub-pericardial petechiæ, small sub-endocardial extravasations invaded one of the curtains of the tricuspid valve and a few in the left ventricle. *Liver*, old perihepatitis, tissues healthy. *Spleen* enlarged, sub-capsular petechiæ. *Kidneys* healthy. *Stomach, cuticular* portion healthy, *villous* portion presented a large *Spiroptera megastoma* tumor measuring 4″ x 2″ x 1″. *Small intestines* presented a healthy appearance. *Large intestine* presented a few small circumscribed patches of congestion in the cæcum and colon, but no ulceration. *Parasites*, a few specimens of the *Strongylus armatus.*

No. LXXI.—An Australian Roan mare, recognized as Surra on the 23rd of September 1892. The *fever* during a period of thirty-four days was of the continued type accompanied by remissions and by the occurrence of intermissions at irregular intervals lasting for a period of from one to three days. At the crisis of the fever on the 13th, 17th and 19th days of the disease sudden falls of from 2·5°C. to 4°C. took place. *Treatment.*—This animal was subjected to a treatment consisting of mixed Cinchona Alkaloids and Arsenic in increasing doses from the 3rd to the 35th day of the disease, on which latter date death took place.

Autopsy.—Body emaciated, slight swelling and œdema of the extremities. Gelatinous exudation found lying subcutaneously in the sternal region. A patch of congestion in the trachea, lumen of the tube occupied by frothy mucus. *Lungs*, apices the seat of localized emphysema, consolidation (broncho-pneumonia) at the anterior and inferior portions of both organs, no sub-pleural petechiæ. *Pericardium* contained a few ounces of amber-coloured fluid. *Heart.* Base, the seat of yellow gelatinous exudation, external surface presented a few sub-pericardial ecchymoses, muscular tissue pale in appearance. No sub-endocardial extravasations in any of the cavities. *Liver* enlarged, old perihepatitis. *Spleen* normal in size, numerous sub-capsular petechiæ. *Kidneys*, healthy in appearance. *Stomach, cuticular* portion healthy, *villous* portion presented several circular, whitish patches but no sign of ulceration. *Small intestines*, healthy. *Large intestine* healthy, contained sixteen specimens of the *Strongylus armatus.* *Brain*, slight congestion of the visceral arachnoid, the lateral ventricles did not contain any appreciable amount of fluid. *Spinal cord* healthy. *Nasal Fossæ*, mucous membrane covering the turbinated bones very dark in colour but not thickened to any great extent.

No. LXXII.—A Bay Australian Gelding, aged 5. Apparently in perfect health and splendid condition. The hæmatozoon was noticed for the first time in the blood on 7th October 1892. The *fever* from the first to the evening of the twenty-fourth day of the disease was of the continued type, marked in most instances by slight daily remissions and exacerbations, and by intermissions of short duration on the seventh and eighth days. A period of apyrexia was present from the evening of the twenty-fourth until the morning of the thirty-third day, after which a second period of fever occurred lasting six days. Again after a fever-free period lasting from the thirty-ninth to the evening of the forty-second day, the temperature again rose until death, which took place on the morning of the forty-sixth day of the disease; albumen appeared in the urine on the eleventh day of the disease and persisted on until the end, the result of an acute desquamative nephritis. *Treatment.*—This animal was subjected to a treatment consisting of Cinchona Alkaloids and Arsenic; at a later date the former drug had to be replaced by Quinæ Sulphatis, but as the latter had no influence on the hæmatozoon in the blood, it was found necessary to go back again to the use of Cinchona Alkaloids. The hæmatozoon was absent from the blood for a period of twenty-six days, but owing to symptoms of Cinchonism supervening the specific treatment had to be abandoned, and the animal succumbed on the third day after its re-appearance in the blood.

Autopsy.—Body emaciated, total absence of œdema. *Lungs,* apices and free edges of the organs, the seat of localized emphysema, sub-pleural ecchymoses. *Heart.*—Blood-stained fluid in pericardial sac, extensive sub-pericardial extravasations, sub-endocardial extravasations involving musculi-papillares of left ventricle. *Liver* enlarged, tissue healthy. *Spleen* much enlarged, few sub-capsular petechiæ. *Kidneys,* small circular extravasations dipping into the cortical portion. *Stomach, cuticular* portion stained yellow, *villous* portion presented four *Spiroptera* tumors. *Small intestines,* localized areas of congestion sub-mucous petechiæ. *Large intestine,* few patches of congestion and a few, specimens of the *Strongylus armatus. Bladder.*—A patch of extravasation at the fundus. *Brain,* &c., healthy in appearance, half an ounce of fluid in the lateral ventricles.

No. LXXIII.— An Australian gelding was purchased by the Bombay Tramway Company on the 17th April 1892, aged 7 years. Fever developed 14th October 1892. A general eruption of Urticaria appeared on the 24th. Hæmatozoon discovered in the blood on the 30th. Between the 3rd and the 8th November the eruption re-appeared every morning but faded each evening. It again re-appeared on the 13th well marked but gradually faded by midday on that date. Finally the eruption broke out on December 9th and was more or less marked daily until the 19th.

This animal was submitted on October 31st, during an intermission, to a treatment consisting of the double Iodide of Mercury and Potassium in gradually increasing doses, commencing with grains ii, and at a later date Quinæ : Sulph : was added. During this period there was present continued fever with marked intermissions at irregular intervals. As this drug proved incapable of arresting the development of the hæmatozoon, Arsenic was substituted on the 22nd November when five grains were given in the evening, with a temperature of 40·8°C. in the form of Liq : Arsenicalis in water. The temperature on the morning of the 27th November registered 38°C., since which date, with two exceptions, *viz.,* on January 2nd and 3rd, 1893, it never reached 39°C. until January 27th.

Autopsy.—Body somewhat emaciated; absence of swelling and œdema. The tissues of the body are all stained an orange colour. *Thorax*—Right pleural cavity contained 3 ozs., the left 4 ozs. of a turbid, orange-coloured fluid. *Lungs*—*Right* presented a variegated colour. Anterior lobule was the seat of emphysema. Anterior portion of the organ measuring 7″ × 5″ × 2·5″ the seat of consolidation, and on section the capsules were divided off by a thin layer of jelly-like exudation. Some calcareous nodules could be felt on passing the hand over the posterior portion of the organ. *Left*—Few nodules; tissues on section fairly healthy in appearance. *Pericardial sac* contained ten ounces of a turbid orange-coloured fluid. *Heart*—Normal in size, external surface free from petechiæ, base surrounded by yellow-coloured exudation. *On section*—Cavities free from sub-endocardial extravasations. Valves, without alterations. *Abdominal Cavity* contained 6 ozs. of a blood-stained fluid. *Liver,* small, signs of old perihepatitis; numerous small calcareous bodies. *On section*—Tissues dark chocolate in colour, somewhat firm. *Spleen*—Normal in size; a few sub-capsular petechiæ. *Kidneys* presented a healthy appearance. *Stomach,* small; *villous* portion contained a *Spiroptera* tumour. *Intestines* presented a healthy appearance. Two small specimens of the *Strongylus Armatus* were found in the cæcum. *Bladder,* contracted; no change in the mucous membrane.

No. LXXIV.—A grey Arab gelding, aged, showed signs of fever on the 14th October 1892. These subsided and re-appeared on the 26th February. The temperature became normal on the 31st and remained at 37·2°C. until the morning of the 7th of November, when the temperature registered 39·4°C. and the hæmatozoon was discovered on microscopical examination of the blood. From that date until the morning of the 24th November three marked periods of fever occurred with irregular intermissions, the maximum temperature attained being 41°C. During a period of twenty-one days, which terminated in death, the temperature oscillated between 39·4°C. and 36·5°C.

Albumen was found in the urine on the 27th day of the disease and persisted until December 4th, the result of a desquamative nephritis. For eleven days previous to death, with one exception, when it was present as a mere trace, albumen was absent.

Treatment.—This animal was (i) subjected to the action of Santonin, with negative results; (ii) the double Iodide of Potassium and Mercury, also with negative results; (iii) Arsenic for twenty-three days, during which time the hæmatozoon was absent for seventeen days from the blood. The animal succumbed on the sixty-third day of the disease.

Autopsy.—Body emaciated, a little œdema in the front of the sternum. *Thorax.*—Each cavity contained between 20 and 30 ounces of fluid.

Lungs.—Both visceral pleuræ were adherent to the parietal for a considerable extent. There were also several extensive sub-pleural extravasations, the anterior lobule and the anterior third of both organs were consolidated. *Pericardial sac* contained ten ounces of an orange-coloured fluid. *Heart* was enlarged, the base was the seat of a considerable amount of yellow gelatinous exudation. *Right auricle* healthy in appearance. *Left auricle* healthy in appearance. *The right ventricle* presented a few sub-endocardial extravasations. *The left ventricle* presented an extraordinary appearance, the upper portion of the cavity being almost black in colour, owing to the presence of extensive extravasations of dark coloured blood beneath the endocardial lining. One lying on the inter-ventricular septum was 3·5″ × 1·5″ and raised one inch above the surrounding tissue. There were also numerous smaller extravasations dotted over the lower half of the cavity. The *abdominal cavity* was free from fluid. The *liver* was normal in size, presented old signs of perihepatitis, together with a few calcareous nodules invading the tissues. *Spleen* normal in size. On section the tissues presented a healthy appearance. *Kidneys,* pale, but presented a healthy appearance. *Stomach.*—The *cuticular* portion normal, the mucous membrane of the *villous* portion was healthy, but two large *Spiroptera* tumors involved its substance. *Small intestines* healthy. *Large intestines* presented a patch of congestion, but no ulceration. *Rectum,* two inches from the anal orifice, there was an ulcer undergoing a reparative process which was situated upon a raised base. *Bladder.*—There were a few small, round extravasations of blood dotted over the mucous membrane.

No. LXXVI.—A grey Australian gelding, No. 328, aged 11 years, had been four years in the country. It was first noticed to be ill on 8th November 1892. The Surra hæmatozoon was discovered in the blood on the 25th November. There was *fever* of the continued type, accompanied by more or less marked remissions and exacerbations from the 26th November to the evening of the 4th December, after which the temperature gradually fell and during a further period of thirty-one days, it never exceeded the healthy limits. The urine from the first contained granular casts, and on thirty-eight days out of thirty-nine, contained albumen, varying in amount from $\frac{1}{40}$th to $\frac{1}{3}$rd. *Treatment.*—For five days this animal was subjected to a treatment consisting of large doses of Liq. Potassæ; but as this chemical appeared to have no effect but for evil on the animal and none whatever on the hæmatozoon, Arsenic was substituted on the eighth day with marked effect from the first, as the temperature and respirations immediately commenced to fall, and the organism, after a short delay, disappeared from the blood and remained so during a period of twenty-seven days. Death occurred on the 4th January 1893.

Autopsy.—Body extremely emaciated, complete absence of subcutaneous adipose tissue and œdema from the extremities and under-surface of the abdomen. *Thorax.*—There was no fluid in the pleural cavities and there were no pleuritic adhesions. *Right Lung.*—Sub-pleural petechiæ, localized emphysema at the apex, anterior half fairly healthy, posterior half dark in colour and œdematous. *Left lung.*—Anterior lobe seat of localized emphysema. The inferior border was the seat of lobular pneumonia, also a circumscribed patch of consolidation on the superior surface. *Pericardium.*—The sac contained 4 ounces of fluid. *Heart*, enlarged. Base and origin of large vessels surrounded with amber-coloured exudation with a few sub-pericardial ecchymoses dotted over it. *On section* valves healthy. No sub-endocardial extravasations. *Liver* normal in size, old perihepatitis of right lobe. *On section* tissues presented a healthy appearance. *Spleen* normal in size, sub-capsular petechiæ ; tissues healthy. *Kidneys* very much enlarged, cortical surface dotted over with purple coloured petechiæ, intervening tissue greyish-brown in colour. *On section* cortical portion the seat of the same kind of petechiæ as described externally. *Medullary portion* presented a healthy appearance. *Stomach.—Cuticular* portion presented a healthy appearance, *villous* portion the seat of a large '*Spiroptera*' tumor involving the fundus of the organ, and a small one on the lateral wall. *Small intestines.* Several patches of congestion, no ecchymoses. Peyers patches were œdematous, but there was no inflammation or ulceration. *Large intestines* contained one patch over which the vessels presented an aborescent appearance, no ulceration. *Rectum* healthy. *Bladder* contained 40 ounces of urine as thick as treacle and a few petechiæ dotted about the under-surface of the mucous membrane.

No. LXXVII.—A Persian gelding, aged 13 years, was purchased 26th November 1886. Attacked with fever 20th November 1892. The Surra hæmatozoon was discovered in the blood 27th November 1892. On the evening of the 29th November an eruption of Urticaria appeared, but again disappeared after the same night. It however recurred on the mornings of the 30th November, 1st, 2nd and 3rd December, fading gradually away towards 6 P.M. on each date. After an absence of five weeks, the eruption again broke out on the evening of 6th January 1893. On November 29th, the day of admission into the Laboratory Hospital, the temperature registered 40·3°C. and on the following morning the animal was submitted to a treatment of Arsenic. The temperature on the morning of the 2nd December had fallen to within normal limits and remained so until the evening of December 31st. From the latter date until January 18th continued fever was present, but the thermometer never registered above 40·1°C.

Autopsy.—Body somewhat emaciated; complete absence of swelling and œdema from the abdomen and extremities. *On section* all the tissues stained yellow in colour. *Thorax.*—There was no fluid in the pleural cavities, and no pleuritic adhesions. *Lungs.*—Both apices and anterior inferior borders were the seat of localized emphysema. A few sub-pleural extravasations of blood were dotted over the organs. *Pericardium.*—The cavity of the sac contained 4 ozs. of a turbid, orange-coloured fluid. *Heart.*—Enlarged. Base—Surrounded by exudation. *External surface* was free from extravasations. *Internal surface.*—Endocardial lining of cavities stained a yellow colour ; no sub-endocardial extravasations. *Valves.*—Healthy. *Abdominal cavity* was free from fluid. *Liver.*—Size normal ; old perihepatitis. *On section* tissues presented a healthy appearance. *Spleen.*—Enlarged to double the normal size ; sub-capsular petechiæ. *On section* tissues firm. Pathological change resembled amyloid degeneration to naked eye. *Kidneys.*—Cortical portion dark in colour. *Stomach*—Small and contracted. *Villous portion* presented a greenish yellow colour ; mucous membrane corrugated, congestion between the rugæ ; no ulceration. *Spiroptera* tumour the size of a small hen's egg invading the fundus of the organ. *Small Intestines.*—Injected more or less in entire length, small patch of extravasation 8 feet from Ileo-cæcal valve ; Peyer's patches were somewhat œdematous, but not ulcerated. *Large Intestines*—Deeply congested patch, but no ulceration. *Colon* and *Rectum* presented a healthy appearance. *Brain.*—Superficial veins congested. Lateral ventricles were free from fluid.

No. LXXVIII.—A grey Australian mare, aged 9 years, had been nearly two years in the country. First noticed to be ailing, 2nd December 1892. The hæmatozoon was discovered in the blood on the 6th December. The *fever* evidently existed previous to the 2nd December ; from the 6th to the 18th, on which day the animal succumbed, the fever was of the continued type, with daily remissions, but only abortive attempts at intermissions. On admission the urine was found to contain a trace of albumen, but it was absent subsequently.

Treatment.—This animal was subjected to a treatment consisting of Arsenic in solution only, and the hæmatozoon was absent from the blood for a period of seven days.

Autopsy.—Body emaciated; hind limbs slightly œdematous. *Thorax.*—Both pleural cavities contained a considerable quantity of fluid and presented extensive adhesions between the costal and parietal pleuræ.

Right lung.—Emphysema at the apex and inferior border; sub-pleural extravasations. *Left lung.*—Dotted over with sub-pleural extravasations; anterior third, the seat of consolidation, posterior ⅔rds was fully distended with air.

Pericardium contained 4 ounces of a turbid, amber fluid.

Heart.— Base surrounded with gelatinous exudation, dotted over with sub-pericardial ecchymoses, as also a small patch at the apex of the organ. The cavities on the right side were blood-stained. The left auricle presented a healthy appearance. The cavity of the left ventricle, especially on its upper half, was the seat of numerous and extensive sub-endocardial extravasations, although the largest hæmorrhages were as usual situated on the surface of the musculi-papillares. *Abdominal cavity* was free from fluid. *Liver* enlarged; old signs of perihepatitis; tissues on section presented nutmeg appearance. *Spleen,* small, numerous sub-capsular petechiæ.

Kidneys.—Cortical portion congested, medullary portion healthy.

Stomach.—*Cuticular* portion healthy, *villous* portion presented a *Spiroptera* tumor of some size near the line of demarcation; otherwise healthy. *Intestines* presented a normal appearance.

No. LXXIX.—A Chestnut Australian gelding, aged 12 years, had been six years in the country. First noticed to be ill on 6th December 1892. The hæmatozoon was discovered in the blood on the same date. The *fever* which attained a maximum of 41·3°C. was of the continued type, with marked daily remissions and intermissions at irregular intervals. The urine from the first contained a large quantity of albumen and continued to do so until death; at a later period casts appeared together with leucocytes. This animal was subjected to a *treatment* consisting of Arsenic in solution from the first, which quickly produced an effect on the hæmatozoon which was absent for thirteen days out of the seventeen, during which the animal survived.

Autopsy.—Body emaciated, some swelling and œdema of the extremities, sheath and under-surface of the abdomen. The visible mucous membranes presented an amber colour, and *on section* the tissues of the body were stained an orange colour. *Thorax.*—The pleural cavities each contained a considerable quantity of fluid, but there were no pleuritic adhesions. *Lungs.*—Both were the seat of sub-pleural ecchymoses, together with emphysema at the apices and free borders. No consolidation.

Pericardium.—The sac contained two ounces of fluid. *Heart* considerably enlarged. The base was the seat of gelatinous exudation, dotted over with a few sub-pericardial ecchymoses, but the muscular structure was free from them. *On section.*—The *right auricle* was free from, but the *right ventricle* presented a few dark-coloured sub-endocardial extravasations which were surrounded by a zone of a lighter colour. *Left auricle* healthy. *Left ventricle,* walls hypertrophied. The upper half of the cavity presented extensive, dark-coloured, sub-endocardial extravasations, which were particularly well marked behind the ‘ chordæ tendineæ ’ and on the upper portion of both musculi papillares.

Abdominal cavity was free from fluid. *Liver* enlarged, old signs of perihepatitis. *On section* tissues appeared normal.

Spleen normal in size, few sub-capsular petechiæ. *Kidneys,* both organs tinged yellow; very numerous, minute sub-capsular petechiæ covered the whole external cortical surfaces, but on section they did not appear to involve the deeper structures. *Stomach, cuticular* portion presented a healthy appearance. The *villous* portion contained a large *Spiroptera* tumor. *The Intestines* presented some patches of congestion, but no ulceration. *Bladder.*—A patch of extravasation was found at the fundus of the organ. No parasites were found in the intestinal tract.

No. LXXX.—An Australian mare, aged 11 years, was purchased by the Bombay Tramway Company on 22nd November 1886. During the six years which elapsed between the latter date and 5th December 1892, the animal had been in the Infirmary only four times for a period of eleven days, *viz* :—four days in 1889 with fever, four days in 1890 with colic, one day in 1891 off its feed, and two days in 1892 from the same cause. The hæmatozoon was discovered in the blood on the 10th December 1892. The animal was admitted into the Laboratory Hospital on the 11th December with a slight eruption of Urticaria observable; the temperature registered 40·6°C at midday. The same evening the animal was subjected to a treatment of Arsenic (grs. iv) in gradually increasing doses; by the morning of the 13th December the temperature had fallen to 38·2°C. and the hæmatozoon was absent from the blood. From this latter date until 18th January 1893, during a period of thirty-seven days, the thermometric observations never reached 39°C., and the hæmatozoon was absent from the blood.

Autopsy.—Body somewhat emaciated; complete absence of swelling and œdema from the extremities and the under-surface of the abdomen. *Thorax.*—No adhesions of the pleuræ, but each sac contained 20 ozs. of a turbid, orange-coloured fluid. *Right Lung.*—Sub-pleural petechiæ bright-red in colour, a localized emphysema at the apex and along Anterior and Inferior borders. *On section.*—Tissue presented a healthy appearance except at the apex and free borders. *Left Lung* presented similar changes to those recorded in the right, but in addition there were two patches of consolidation involving the posterior $\frac{1}{3}$rd of the organ, separated from each other by two inches of healthy lung tissue. *Pericardium*—The sac contained 2 ozs. of a turbid, viscid, orange-coloured fluid. *Heart.*—Enlarged; absence of exudation round the base of the organ. Numerous small sub-pericardial ecchymoses dotted over the external surface, and a large extravasation, one inch in diameter, involved the wall of the Right Ventricle. *On section.*—Three of the cavities presented a few small sub-endocardial ecchymoses, but the Left Ventricle, which was stained a yellowish colour, was dotted over with bright-red ecchymoses, and several extensive extravasations which for the most part involved the musculi-papillares. *Abdominal Cavity* contained two ounces of a clear, straw-coloured fluid. *Liver*—Normal in size; presented a few sub-capsular petechiæ and small calcareous nodules. *On section.*—The tissues presented a nutmeg change. *Spleen*—Normal in size, numerous sub-capsular petechiæ of a brick-red colour. *On section*—Tissues firm, appearance healthy. *Kidneys.*—Cortical portion thickly dotted over with minute petechiæ. Medullary portion free. *Stomach.—Cuticular* portion healthy. *Villous* portion presented numerous bright-red coloured ecchymoses lying under the mucous coat, $\frac{1}{16}$th to $\frac{1}{8}$th inch in diameter; patches of superficial erosion of the mucous lining. *Small Intestines* presented a healthy appearance. *Large Intestines* presented a healthy appearance.

No. LXXXI.—Grey Herati mare (No. 197) aged 9 years, was purchased by the Bombay Tramway Company on 6th March 1889. The animal was observed to be ailing on 9th December 1892; Temp. 39·1°C. The Surra hæmatozoon was discovered on the morning of the 18th December. The animal was admitted into the Laboratory Hospital on the morning of the 21st.

On the morning of the 23rd December the animal was subjected to a treatment consisting of Liq. Arsenicalis grs. iv, twice during the twenty-four hours, and the dose was gradually increased or diminished according to the condition of the patient.

The urine which had been normal in character up to midday on the 28th suddenly on that evening contained a considerable quantity of blood, blood casts and Carbonate of Calcium crystals.

Autopsy.—Body somewhat emaciated; absence of swelling and œdema from the abdomen and extremities. *On section.*—Tissues stained an orange colour. *Thorax.*—Right pleural cavity contained two ounces of a turbid, orange-coloured fluid. The left pleural cavity was free. No pleuritic adhesions. *Lungs.*—Free from sub-pleural ecchymoses. *Right lung* —Healthy. *Left.*—Anterior six inches consolidated. *On section*—Lobules insulated by thin layers of exudation; remaining portion healthy. Cavity of the *pericardium* free from fluid. *Heart.*—Normal in size. *External surface* free from extravasations of blood. *Internal surface.*—Endocardial membrane lining the cavities stained yellow in colour, but free from extravasations. *Valves.*—Healthy. *Abdominal Cavity.*—Free from fluid. *Liver,* normal in size; old perihepatitis of right lobe. *Left*—Free. *On section.*—Tissues friable and invaded by concretions; *sub-capsular* concretions. *Spleen*—Twice the normal size, few sub-capsular petechiæ; tissues, firm and healthy. *Kidneys.*—Malpighian corpuscles visible as red points. *Stomach.*—Small. *Villous portion.*—Tissues along the line of demarcation congested, no ulceration or erosion of the mucous membrane. *Intestines,* Small and Large, were stained an orange colour, but no pathological changes were present. *Bladder.*—Healthy. No parasites were observed.

No. LXXXII.—Black Australian mare, aged 8 years, was purchased by the Bombay Tramway Company on 22nd December 1888. The animal was found to be ailing on 15th December, 1892. Temperature rose on the morning of 18th to 40·3°C and the Surra hæmatozoon was discovered in the blood on the same date. The animal was admitted into the Laboratory Hospital at 8 A.M. 21st December. Temperature 38°C. On the morning of the 23rd a treatment consisting of Arsenic in the form of Liq. Arsenicalis was adopted. The animal received at first the full physiological dose of grs. iv twice daily which was increased or diminished according to the exigencies of the case. The temperature on the evening of the 23rd December attained a maximum of 40·6°C, but subsequently fell gradually until it reached 37·8°C. on the morning of the 26th December and since that date up to the 15th February with one exception—28th January 1893, when it rose to 39°C. in the evening—has never exceeded 38·7°C. Death took place on 26th February 1893.

Autopsy.—Body emaciated; absence of all swelling and œdema. *Thorax.*—Pleural cavities each contained 30 ozs. of a dark, blood-stained fluid; no pleuritic adhesions. *Right Lung* presented a few sub-pleural ecchymoses, and the right lobule was the seat of a localized emphysema. *On section.*—Tissues appeared healthy. *Left Lung* presented a few sub-pleural ecchymoses. There were two patches of consolidation, one occupying the apex, the other, the more extensive of the two, the base, the lobules in each instance being divided off by a layer of exudation varying in thickness. The cavity of the *pericardium* contained 6 ozs. of a dark red-coloured fluid. *Heart*—Externally, the surface of the right auricle presented numerous sub-pericardial ecchymoses. *On section*—All the lining membranes of the cavities are blood-stained, but the right ventricle presented a few sub-endocardial extravasations. The *abdominal cavity* contained forty ounces of a dark blood-stained fluid. *Liver*—Small, but fairly healthy. *Spleen*—Normal in size, presented numerous sub-capsular petechiæ; tissues firm. *Kidneys.*—Equal in weight; tissues healthy to the naked eye. *Stomach.*—The *villous* portion contained a *Spiroptera* tumour. *Intestines*—Healthy in appearance; no parasites. *Bladder*—Healthy.

No. LXXXIV.—A Grey Persian Gelding, aged 8 years, was purchased by the Bombay Tramway Company on November 27th, 1889. *Previous History*—Good. *Present Illness*—January 19th, 1893. Off-feed for two days, returned to work, but re-admitted to Infirmary on 23rd. Temp. A. M. 39·1°C., 4 P.M. temperature 40·5°C., hæmatozoon discovered in the blood. On admission to Laboratory Hospital presented ordinary symptoms of Surra at an early stage of disease. The *fever* was of the continued type with remissions, but as the organism on the morning of the 6th day was absent from the blood, the animal was placed on an Arsenical treatment, commencing with a dose of gr. iv bis die. This was gradually increased to gr. v on the 9th day, and continued until the evening of the 11th, after which date in consequence of the very virulent symptoms of Surra presented, together with dulness and physical prostration, all treatment was abandoned. The hæmatozoon again appeared in the blood on the 17th, and on the 18th had increased in numbers. Death took place somewhat suddenly at 5-30 P.M. on the latter date.

Autopsy.—Body fairly well nourished, œdema of the extremities and under-surface of the abdomen and front of sternum. *Thorax.*—No fluid in pleural cavities or adhesions of the pleuræ. *Lungs* presented a few extensive, sub-pleural extravasations; emphysema at the apices. *On section*—Tissues œdematous. *Pericardial cavity* contained 6 ozs. of a turbid, amber-coloured fluid. *Heart*—Enlarged; weighed 6 lbs. ¾ oz. No sub-pericardial petechiæ. *On section*—Right side blood-stained, no sub-endocardial extravasations noticeable. *Left side*—Contracted. Presented a few sub-endocardial extravasations, principally on the bases of the musculi-papillares. *Liver*—Small, weighs 9 lbs. 12½ ozs; old signs of perihepatitis. *On section*—Tissue appeared healthy. *Spleen*—Enlarged, weighed 2 lbs. 6 ozs; sub-capsular petechiæ. *Tissue,* firm. *Kidneys*—Right weighed 1 lb. 8 ozs. Left, 1 lb. 6½ ozs. *On section* presented a healthy appearance. *Stomach*—Fairly large. *Cuticular* portion healthy. *Villous* portion stained yellow. Mucous membrane presented a healthy appearance.

PART II.

EXPERIMENTAL CASES.

Horse No. IV.—Grey C. B. gelding, aged 15 years. Subcutaneously inoculated on 8th November 1890 with 1·0 c.c. of blood taken from the Jugular Vein of Horse No. III *ante-mortem.* The *latent* period occupied eight days. The *fever* which was of a remittent type began to rise on the day previous to the appearance of the organism in the blood of the general circulation and was characterized by morning remissions and evening exacerbations, reaching a maximum of 41°C. on the evening of the fourth day of the disease; for the next three days the temperature touched 40·6°C. each evening and was followed by remissions of 2°C. each morning; an intermission lasting two days then occurred, followed by seven days of continued fever, and death occurred on the 2nd December, the 17th day of the disease.

Horse No. V.—Bay C. B. horse, aged. Inoculated subcutaneously on the 18th November 1890 with 3·0 c.c. of blood taken from the Jugular Vein of horse No. IV during life. The *latent* period occupied four days and was marked by exacerbations and morning remissions in the temperature until the day upon which the hæmatozoon appeared in the blood, when it rose to 39·6°C and then gradually fell to 36·8°C in the next thirty-six hours, a rise occurring up to death on the fourth day of the disease.

Autopsy.—A small circumscribed patch of pneumonia involving the apex, and another the size of a walnut lying superficially in the posterior lobe of the right lung, also a sub-pleural extravasation of blood. Pigmented condition of *cuticular* and congested state of the *villous* portion of the stomach.

Horse No. VI.—Grey Persian, aged. Inoculated subcutaneously on the 22nd November 1890 with 1·0 c.c. of blood taken from the Jugular Vein of Horse No. IV. The *latent* period was five days. On the day following the injection of blood, no change had taken place, but on the morning of the third day a small raised tumor, one inch in diameter, was apparent. This increased in size until the evening of the fifth day when it remained stationary for a few hours and then a loss of tension and tenderness of the part was observed together with the discovery of the organism in the blood on microscopical examination. On the morning of the twelfth day of the disease an eruption of Urticaria appeared involving the skin of the whole body. Temperature on the evening before 40·2°C.; but on the morning of the eruption was 37·8°C. The organisms were numerous in the blood on the day prior to, few during the persistence of the rash, and numerous again on the day following the eruption. This case lasted for forty-five days and during that period assumed the continued type of fever marked by remissions and one intermission on the 7th and 8th days of the disease.

Autopsy.—Localized emphysema of the apices of the lungs, surfaces dotted over with sub-pleural extravasations of blood. The *heart* presented sub-pericardial extravasations, but no sub-endocardial were observed. There were petechiæ dotted over the *cuticular* mucous membrane of the stomach, and thickening of the pyloric opening. *Spleen* and *liver* large and petechiated. *Intestines*, ditto. This case was for some days submitted to a treatment by subcutaneous injection of Mercuric Perchloride, and later to that of Iodine and Iodide of Potassium.

Horse No. VII.—White, C. B. horse, aged. Subcutaneously inoculated on the 10th December 1890, with 1·0 c. c. of blood serum, taken from Horse No. III two hours *post mortem.* The *latent* period occupied eight days. The temperature rose from 37·7°C. to 39·3°C. on the day before the appearance of the hæmatozoon. From this date until death on the tenth day of the disease the *fever* assumed the continued type with marked remissions in the mornings, but with no intermission. Marked pathological lesions in the heart, liver, spleen, &c.

Horse No. VIII.—Bay Country-Bred Gelding, aged 10 years. Inoculated subcutaneously on 19th December 1890 with 1·0 c.c. of blood taken from the Internal Jugular Vein of Horse No. VII during life. The swelling at the seat of inoculation became evident on the following day and increased until the morning of the fifth day, when it remained stationary until the expiration of one hundred and twenty hours. At that time the tension and tenderness of the part had partially disappeared and the hæmatozoon was discovered on microscopical examination of the blood. The *latent* period occupied five days. The temperature fell several points on the morning following inoculation but by the following morning had risen to the extent of 2·1°C, but by the morning of the fourth day had again fallen 1·2°C. From this date the *fever* assumed the continued type with irregular periods of intermission and several rises and sudden falls in the temperature.

Autopsy.—Small quantity of fluid in the pleural cavities, increase in the quantity of pericardial fluid, several large sub-endocardial extravasations, the largest being 1·5″ × ·75″, involving the right and left ventricles of the heart. *Liver* much increased in size ; *spleen* and *stomach* normal.

Horse No. XI.—Chestnut Country-Bred, Entire, aged. Subcutaneously inoculated on 11th January 1891 with 1·0 c.c. of blood taken from the heart of Horse No. VIII, 10·5 hours P.M. The *latent* period occupied eleven days. The temperature varied between 38·8° C. and 37·6° C. until the morning of the eighth day after inoculation, when it commenced to rise, and attained 40·5° C. on the morning of the tenth day ; it then gradually fell until the morning of the twelfth day, when the hæmatozoon was discovered in the blood. From this latter date until death, on the thirty-fifth day of the disease, the *fever* assumed the continued type with intermissions at irregular periods.

Autopsy.—Body considerably emaciated. Twenty ounces blood-stained fluid in the right pleural cavity. *Lungs* the seat of sub-pleural ecchymoses and concretions ; localized emphysema at the apices. *Heart* presented externally a few sub-pericardial extravasations. *On section.*—Cavities free, with the exception of the left Ventricle which contained numerous, extensive sub-endocardial extravasations. *Liver* small ; old perihepatitis of right lobe. *Spleen*, few sub-capsular petechiæ. *Kidneys* healthy. *Stomach.*—*Villous* portion presented a few, small, isolated patches of congestion ; no ulceration.

Horse No. XII.—Vide *Rat Surra*, Vol. II.

Horse No. XIII.—Vide *Rat Surra*, Vol. II.

Horse No. XIV.—Grey Country-Bred Galloway, entire, aged. Inoculated on the 30th January 1891, with 0·7 c.c. of blood directly into the Internal Jugular Vein, taken from Horse No. XI during life. The *latent* period occupied five days. On the day following the inoculation the temperature suddenly rose from 37·3°C. to 39·5°C. followed on the day previous to the appearance of the organism in the blood by a sudden fall from 39·6°C. to 36·2°C., or 3·4°C. On the evening of the same day, the temperature again rose to 38·7°C. and steadily continued its course until the evening of the second day of the disease, when it registered 40·1°C. The *fever* then assumed the continued type accompanied by remissions and with irregular periods of intermission until the twenty-first day of the disease, when it began to gradually fall until the time of death on the twenty-second day when it reached 36·1°C. There was only one day, the 9th, after the appearance of the organism, during which the hæmatozoon was absent from the blood during the whole course of the disease; but on several occasions abortive attempts were made to disappear.

Autopsy.—Localized emphysema at the apices of the lung; the surfaces were dotted over with sub-pleural extravasations of blood. *Heart* presented numerous sub-pericardial and sub-endocardial petechiæ. The *Liver* and *spleen* enlarged, small extravasations on the capsule of the latter. *Kidneys* presented numerous round purple petechiæ on their cortical surfaces. *Small intestines* presented a few petechiæ dotted over the surface of the mucous membrane. This animal was subjected to subcutaneous injections, and on one occasion Oleum Terebinthinæ was injected directly into the general circulation.

Horse No. XV.—Brown Country-Bred Galloway, aged. Inoculated on the 30th January 1891 with 0·8 c. c. of blood directly into the Internal Jugular Vein, taken from Horse No. XI during life. The *latent* period occupied six days. The temperature rose from 37·5° C. to 39·1°C. on the evening before the appearance of the organism in the blood, and from that date assumed the continued type of *fever* accompanied by slight daily remissions and irregular periods of intermission. The animal died on the thirty-fifth day of the disease, *viz.*, 11th March 1891.

Autopsy.—Localized emphysema at the apices, and sub-pleural extravasations of the lungs; sub-pericardial and sub-endocardial extravasations involving the heart, with congested and ecchymosed patches on the *villous* mucous membrane of the stomach; much enlarged liver and spleen, &c. This animal was at first submitted to direct injections of Potass: Bichromate into the general circulation, but owing to local complications, gastric ingestion was substituted for the former method of administration of the drug.

Horse No. XVIII.—Chestnut Country-Bred Horse, aged. Inoculated subcutaneously with 2·0 c.c. of blood taken from the heart of Horse No. XV, 10 hours P.M. on 12th March 1891. The *latent* period occupied 13 days. Temperature normal for 12 days, rise of 1°C. corresponding with the appearance of the hæmatozoon, between the 11th and 29th days of the disease; continued fever accompanied by a few remissions at irregular intervals was present. Swelling of the sheath and effusion into the tunica vaginalis testis occurred on the 21st day of the disease. The animal succumbed on the 29th day.

Autopsy.—Body slightly emaciated. Œdema of limbs, scrotum, sheath and under-surface of abdomen. *Lungs*, localized emphysema at the apices; some calcareous nodules. *Heart* presented externally, especially posteriorly, several groups of sub-pericardial extravasations. *On section.*—Cavities free from sub-endocardial extravasations except the left ventricle which presented a few, mostly involving the musculi papillares. *Liver* small, old perihepatitis, especially of right lobe. Few concretions. *Spleen* enlarged, but somewhat soft; no subcapsular petechiæ. *Kidneys* healthy. *Stomach* small; no pathological lesions. *Small and Large Intestines.*—Healthy.

Horse No. XIX—Grey Country-Bred Horse, aged. Inoculated subcutaneously with 2·0 c. c. of blood removed from the heart of Horse No. XV, 10 hours *post mortem* on 12th March 1891. The *latent* period occupied 9 days. A gradual rise in the temperature took place from the day of inoculation to 41°C. on the day previous to the appearance of the hæmatozoon in the general circulation, followed by a gradual fall of 3·4°C. to 37·6°C. on the second day of the disease. The temperature then oscillated until the morning of the twelfth day when it took on the type of continued fever accompanied with irregular periods of intermission until death which took place on 15th May 1891, the fifty-sixth day of the disease.

Autopsy.—Considerable exudation into the subcutaneous tissue of the chest, abdomen and sheath. Peculiar areas of tissue in the lungs presenting a fine reticulated structure. Sub-pericardial and sub-endocardial extravasations of the heart. The deposition of a yellow or somewhat orange material on the surface of the *cuticular* portion of the stomach.

Horse No. XX.—Grey Australian Gelding aged 16 years. The animal was kept under observation for some time and during this period appeared perfectly healthy. Attempt made to produce the disease in a somewhat similar manner to that in which it is naturally contracted. Small quantities of blood were given at short intervals in a large bulk of water by the mouth. On 4th, 9th and 11th of May minims iv, viij, and vi of blood containing the hæmatozoon were respectively given, followed on the 6th, 14th, 16th and 17th of June by varying quantities, namely, minims viij, xxx, x and xxv respectively. As no symptoms had presented themselves by the 28th of the same month and the blood presented a perfectly healthy appearance on microscopical examination, two hundred minims were given in water to the animal to drink, that is, fifty-six days after the first exhibition of the blood. With one exception between the 28th of June and the 10th of September, the temperature never exceeded the normal range of health, but on the latter date suddenly commenced to rise and from 37·5° C. attained 40·4°C. by midday on the 11th. From this date until the 10th day of the disease, the continued type of fever accompanied by daily remissions and exacerbation was present. Then followed three well marked periods of fever, the temperature gradually rising for several days previously and attaining a maximum of between 41°C. and 42·1°C. at midday on the 11th, 17th and 23rd days of the disease, followed by somewhat sudden falls registering from 3°C. to 3·5°C. on the mornings following, each fever period being separated by one of apyrexia varying from one to three days in length. Finally presenting the continued type of fever accompanied by remissions and a few intermissions at irregular intervals between the 28th and 41st days of the disease. The *latent* period, if taken from the first exhibition of the soiled blood to the animal and the appearance of the hæmatozoon in the general circulation, occupied one hundred and thirty days, but if counted from the last exhibition, then only seventy-five days. On 19th September, *i. e.*, the ninth day of the disease, a slight Urticarial eruption appeared on the fore and hind quarters. Death took place on the 21st October 1891, on the forty-first day of the disease.

Autopsy.—Emaciation, swelling and œdema of the extremities. *Lungs* localized emphysema at the apices. The cavity of the *pericardium* contained two ounces of fluid. One sub-pericardial extravasation, three-quarters of an inch in diameter, was found lying on the muscular substance of the right ventricle. Sub-endocardial extravasations present in the ventricles. *Liver* old signs of perihepatitis. *Spleen* normal in size, a few sub-capsular petechiæ. *Stomach* presented a healthy appearance. *Small intestines* several circular extravasations, no swelling or ulceration. *Large intestines and rectum* presented a healthy appearance.

Horse No. XXI.—Grey Country-Bred Gelding aged. Subcutaneously inoculated on the 29th April 1891, with 1·0 c.c. of blood taken from the Jugular Vein of Horse No. XIX *ante mortem*, the hæmatozoon being absent from the blood at the time. On the seventh day after the injection of blood a raised tumor three inches in diameter was found occupying the seat of inoculation, presenting the usual signs of tenderness and tension of the part on manipulation. These conditions continued until the morning of the ninth day, when the tumor was found to be flaccid and to have lost the previous symptoms. On examination of the blood of the general circulation microscopically the organism was found in small numbers in it. The *latent* period occupied eight days. The temperature commenced to rise from 38·2°C. on the last day but one, of the period of incubation and continued uninterruptedly until the evening of the third day of the disease, when it reached a maximum of 41·7°C. From this time it gradually fell and attained a minimum on the morning of the fifth day of the disease when the temperature registered 39·1°C. Five such periods of continued fever took place in twenty-nine days, followed by well marked intermissions at somewhat regular periods, *viz.*, a remission only on the fifth day, but intermissions on the 12th, 19th, 24th and 28th days of the disease. Death followed the last on June 4th. On May 10th slight hæmorrhage occurred from the inner canthus of the right eye, which blood presented the hæmatozoon on microscopical examination. On May 15th two small irregular shaped extravasations of blood dark in the centre and surrounded by a zone one-third of an inch in width of a lighter colour was noticed, accompanied by a discharge of clear fluid from the same nostril, which latter on the 25th presented a greenish colour and the consistency of white of egg. On the 28th the œdema of the abdominal walls measured $10\frac{3}{4}''$ across at the sternum, 17″ at the umbilical region and 19 inches in front of the sheath. This layer of semi-solid œdematous material measured five inches in thickness (*vide* photograph). Epistaxis occurred on the 1st June 1891.

Autopsy.—Emaciation, semi-solid œdema under belly; œdema of the sub-pleural connective tissue. *Lungs.*—Tissues stained yellow colour; localized emphysema of the apices and free borders. *Heart*, yellow œdematous material round the base of the organ and accompanying the coronary vessels in their course. Left ventricular valves presented two patches of extravasation in their substance one in each valve. *Stomach, villous* portion, mucous membrane thickened and presenting a purple colour. *Liver* very much enlarged. *Spleen* normal. *Kidneys*, several ecchymoses dotted over the surfaces of both organs. *Small intestines.*—Few patches of ecchymoses lying in the mucous membrane. *Large intestines*, healthy. Twelve grammes of Sodii Salicylas : were administered on the 14th May, but no lowering effect was produced on the temperature thereby.

Horse No. XXII.—Brown Country-Bred Pony, aged. Subcutaneously inoculated on 29th May 1891, with 1·0 c.c. of blood taken from the Jugular Vein of Horse No. XXI *ante mortem.* Swelling and œdema appeared at the seat of inoculation forty-eight hours later and had increased still more after sixty hours with the other symptoms usually observed. On the morning of the fifth day or ninety-six hours after the injection of blood, the tension and tenderness of the part had to some extent disappeared and the hæmatozoon was discovered in the blood of the general circulation. Continued fever existed from the very first, accompanied by remissions and at irregular periods by intermissions of short duration. The evening before death the temperature fell to 36·2°C. and remained at the same degree until the following morning when it suddenly rose 3°C. in a few hours. Death occurred on the twenty-first day of the disease, June 22nd. On the 1st June an ulcer, one-third of an inch in diameter, situated on a raised base appeared at the margin of the right nostril, from which hæmorrhage took place during the nights of the 14th and 16th of the same month. On 12th June, the eleventh day of the disease, an Urticaria appeared involving the skin of the neck, shoulders and chest with a few patches over the abdomen, which disappeared after twelve hours. On the 19th day of the disease a slight opacity of the right cornea was noticed and an ecchymosis of some size lying on the sclerotic and bordering on the upper and inner edge of the cornea.

Autopsy.—Emaciation, sub-pleural extravasations, extravasation involving one of the right auriculo-ventricular valves. *Liver*, large, presented signs of old perihepatitis. *Spleen*, enlarged, few petechiæ under the capsule. *Kidneys*, healthy. *Stomach, cuticular* portion contained *œstridæ*, was stained yellow; the mucous membrane of the *villous* portion considerably thickened and congested and covered with glairy viscid fluid.

Treatment.—Three grammes of Antipyrin in water were injected subcutaneously with a temperature of 41·1°C. and the hæmatozoa swarming in the blood, and a few hours later four grammes were administered by the mouth with the effect that the temperature was only lowered two-fifths of a degree Centigrade.

Horse No. XXIII.—Chestnut Country-Bred Horse, aged. Subcutaneously inoculated on the 4th June 1891, with 1.0 c.c. of blood taken from the heart of Horse No. XXI, 5-5 hours P.M. A tumor appeared at the seat of inoculation which gradually increased in size and was accompanied by tension and tenderness of the part until the sixth day, remained stationary until the ninth day, when it was found to have diminished in size, &c., and the hæmatozoon present in the blood. The *latent* period occupied eight days. The temperature remained normal until the evening after the first appearance of the organism in the blood. It then attained 40·2°C. on the second day of the disease, and from that date until the 15th day took on the continued type with intermissions at irregular periods, and from the latter date until death, which occurred on the 29th day, the temperature oscillated, but seldom exceeded the maximum limit of the normal range. The chief point of pathological interest was the presence of sub-endocardial ecchymoses in the left ventricle and their absence from the right.

Horse No. XXIV.—Brown Country-Bred Mare, aged. A short incision was made in the white skin of the muzzle, a quarter of an inch in length and just through the cuticle, so as not to cause any bleeding. A drop of blood was taken from Horse No. XXII in which very numerous hæmatozoa were present, and a small quantity, *a fraction of a minim*, of it was immediately placed between the edges of the incision. No change was observed until the morning of the fourth day, when some induration was noted at the seat of inoculation and a pink flush, a third of an inch in width, surrounding it. The induration increased until the morning of the sixth day, after which it remained unchanged until the eighth day, when it was found to have diminished in size and a few hæmatozoa were discovered in the blood of the general circulation. The *latent* period occupied seven days. There was continued fever with remissions for the first nine days followed by a period of six days until death on the 6th July, the fifteenth day of the disease, during which the temperature only just exceeded the normal limit of health.

Autopsy.—Emaciation. Emphysema especially at the apices and along the free borders of the lungs with a few sub-pleural extravasations; tissues stained a yellow colour. *Pericardium* contained two ounces of fluid. *Heart*, yellow gelatinous exudation round the base of the organ, dotted over with ecchymoses. There were a few sub-endocardial extravasations in the ventricles. *Liver*, enlarged, a few calcareous bodies encapsuled in the tissues. *Stomach*, a patch of congestion on the mucous membrane of the *villous* portion. *Spleen* enlarged, a few sub-capsular ecchymoses. *Kidneys.*—Both organs found lying in a bed of yellow gelatinous exudation, pale but healthy in appearance. *Intestines* healthy in appearance. *Brain* membrane pale, veins distended with dark fluid blood, tissues pale, lateral ventricles distended with fluid. *Nasal* mucous membrane intensely congested.

Horse No. XXVI.—Grey Country-Bred Horse, aged. Two hundred cubic centimetres of blood were removed from the heart of Horse No. XXII. on 22nd June 1891, one hour and ten minutes *post mortem*, and were administered by the mouth to this animal. The blood given contained very numerous hæmatozoa an hour previous to death. Slight œdema of no importance however occurred on the inner side of the right thigh on the 6th July, and six days later ecchymoses were observed on both conjunctival membranes. At the same time the animal appeared to be losing flesh. Twice daily a careful examination was made in order to be "au courant" with any symptoms which might appear, externally or in the blood. From the time of administering the blood until the commencement of November 1891, the temperature did not exceed the normal range; but on the evening of the 5th of that month it rose to 39·2°C. and the following morning fell to 37·6°C., but again became elevated the same evening and remained so until death on the 9th.

Autopsy.—Emaciation. *Lungs*, well marked emphysema. Localized patch of consolidation in the centre of the right anterior lobe. The lobules divided off from one another by lemon-coloured gelatinous exudation, pleura thickened. *Heart*, healthy. *Liver*, small. *Spleen*, normal in size, no petechiæ. *Kidneys*, healthy. In this case it would appear that the *post mortem* blood given by gastric ingestion failed to reproduce the disease.

Horse No. XXVII.—Brown Country-Bred Gelding, aged. Subcutaneously inoculated on the 16th July 1891 with 2·0 c.c. of blood taken from the ventricles of the heart of Horse No. XXX, sixteen hours after death. One cubic centimetre was injected on the right side from right ventricle and 1c.c. was injected on the left side from the left ventricle. After considerable swelling and œdema had taken place at the seat of inoculation on the left side, it suppurated. The swelling and œdema on the right side disappeared to a great extent by the 23rd July, leaving a tense and tender tumor, which maintained these conditions until the morning of the 27th, when it was found that the tension of the part had considerably diminished, and the tenderness on manipulation had almost disappeared. At the same time the hæmatozoa were numerous in the blood. The *latent* period occupied eleven days. Temperature presented an intermittent type although it never exceeded the normal range in the horse from 37·2°C. to 39·3°C. Death occurred on the 29th July.

Autopsy.—Small extravasations of blood found lying under the visceral pleuræ, also sub-endocardial. Perihepatitis, enlarged liver, spleen enlarged to three times normal size. Few petechiæ dotted over the mucous membrane of the small *intestine.*

Horse No. XXIX.—Brown Arab, entire, aged. Subcutaneously inoculated on the 7th July 1891 with 0·8 c.c. of blood containing a few hæmatozoa taken from the Jugular Vein of Horse No. XXIII. The swelling and œdema at the seat of inoculation increased until the 7th day when it measured 2·5″ × 1·5″ and on the following morning the tumor presented a flaccid appearance with loss of tenderness and tension of the part on manipulation, and the hæmatozoon was discovered in the blood on microscopical examination. The *latent* period occupied seven days. Temperature remained sub-normal until the evening of the sixth day after inoculation, when it assumed the continued type accompanied by remissions and well marked intermissions; the last occurred on the morning of the day on which the animal succumbed, rising again 3·2°C. before death.

Autopsy.—9 A.M. Decomposition too far advanced to make satisfactory examination.

Horse No. XXX.—Dunn Country-Bred Mare, aged. Subcutaneously inoculated on the 7th July 1891 with 1·0c.c. of blood taken from the Jugular Vein of Horse No. XXIII ante-mortem. The *latent* period occupied seven days. The swelling at the seat of inoculation presented a small raised tumor on the day following the injection of blood which steadily increased in size accompanied with tenderness and tension of the part until the morning of the seventh day when it measured 6″ × 3″ × 1″. On the day following the swelling had diminished in size, was flaccid and the tenderness considerably less than on the day previously and a few hæmatozoa were found in the blood of the general circulation on microscopical examination of that fluid. The temperature registered 38·3°C. on the evening of inoculation and remained about 38°C. for the next two days. From this latter date until death on the 15th July there were marked exacerbations in the evening and intermissions in the morning averaging 2°C.

Autopsy.—Some emaciation, localized emphysema of the apices and borders of the lungs; some sub-pleural ecchymoses. *Heart.*—Yellow-coloured jelly-like exudation round the base of the organ, several sub-pericardial ecchymoses and sub-endocardial extravasations involving the walls of the right auricle and both ventricles. *Liver*, small. *Spleen,* considerably enlarged, dotted over with ecchymoses. *Stomach.*—Yellow pigmented condition of the *cuticular* and *villous* portions. *Kidneys* presented numerous small patches of extravasation involving the cortical portion of the organs.

Horse No. XXXI.—Was inoculated subcutaneously with 0·3c.c. of blood taken from the right ventricle of Horse No. XXXIII eight hours P.M. on the 11th July 1891. The *latent* period was nine days. There was entire absence of swelling and œdema from the seat of inoculation. The temperature was sub-normal until the first day of the disease, but was then followed by the continued fever with irregular periods of intermissions. Death occurred on August 2nd somewhat suddenly on the 14th day of the disease. Extensive pathological lesions were found, viz., circumscribed pneumonia of the anterior lobe of the left lung, numerous sub-endocardial extravasations in the ventricles of the heart, together with those of the spleen and stomach.

Horse No. XXXII.—Light Chestnut Country-Bred, aged. Subcutaneously inoculated on the 11th July 1891, with 0·3 c.c. of blood taken from the right ventricle of the heart of Horse No. XXIII, eight hours P. M. The *latent* period occupied nine days. The temperature was sub-normal until the evening of the day prior to the discovery of the hæmatozoon. On the following day it attained 38°C. and the organisms were numerous in the blood. The animal died on the second day of the disease.

Autopsy.—Sub-endocardial lesions were found in the right and left ventricles of the heart.

Horse No. XXXIII.—Brown Country-Bred entire, aged. Inoculated subcutaneously with 1·0c.c. of serous fluid drawn from the left tunica vaginalis testis of Goat No. III on 25th July 1891. The *latent* period occupied five days.

An Urticarial eruption appeared forty-eight hours after the first appearance of the hæmatozoon in the blood and persisted for twelve hours. The continued type of fever accompanied by remissions appeared on the second day, and was followed by an intermission on the fourteenth, and by death on the seventeenth day of the disease. Extensive pathological lesions were found invading the walls of the heart externally and internally.

Horse No. XXXIV.—Was inoculated subcutaneously on the 2nd August 1881, with 1·0 c.c. of blood taken from the Internal Jugular Vein of Horse No. XXXI. The *latent* period was twelve days. The temperature remained sub-normal until after the appearance of the hæmatozoon in the blood for the first time. It then rose 2·7°C. in eighteen hours. The animal only survived the appearance of the organism twenty-seven hours, death on August 15th. Extensive pathological lesions were found involving the heart and other organs together with the presence of a considerable quantity of fluid in the lateral ventricles of the brain.

Horse No. XXXVIII—Was subcutaneously inoculated on the 26th August 1891, with 1·0 c.c. of blood taken from the heart of Horse No. XL, nine and half hours *post mortem.* The *latent* period occupied nine days. The rise of temperture in this case was peculiar in that, although it followed for a few days the usual zig-zag course, increasing 0·5°C. per day, it was characterized by a morning exacerbation and evening remission, until the sixth day of the disease, when an apyrexial period occurred lasting four days. Between the ninth and thirty-fifth days of the disease, alternate fever and fever-free periods existed, the fever attaining a minimum in the morning or at midday and being generally followed in the night by a sudden fall of from 2°C. to 3°C. and finally during the last night days being again accompanied by fever of a remittent type, with exacerbations and remissions. This animal developed kidney complications characterized by the presence of albumen and epithelial casts in the urine and later by granular and hyaline casts. The urine remained alkaline until seven days before death, when it became respectively faintly alkaline, neutral, acid and finally strongly acid. Death occurred on the 16th October 1891, Cheyne-Stokes respiration being present for a short time before it occurred. Extensive pathological lesions were observed in the heart, with complete absence of any in the stomach, and of parasites from the intestinal tract.

Horse No. XL.—Was subcutaneously inoculated at noon on 15th August 1891, with 0·6 c.c. of blood taken from the Internal Jugular Vein of Horse No. XXXIV, one and a quarter hours P.M. Sixty-eight hours later, an Urticarial eruption broke out. It persisted for 74 hours and then commenced to fade after the hæmatozoon appeared in the general circulation. The *latent* period occupied six days. Decrease in size of the tumour at the seat of inoculation and the simultaneous appearance of the organism in the blood. Temperature sub-normal until the presence of the hæmatozoon, when it rose and followed the continued type of fever with remissions until death on the 6th day.

Autopsy.—Patches of congestion involving the mucous membrane of the *villous* portion of the stomach, also three small circular ulcers, undergoing the process of healing and a female specimen of *Ascaris megalocephala* in the same cavity, also lesions involving the heart, lungs, &c.

Horse No. XLI.—Was subcutaneously inoculated on 26th August 1891 with 1·0 c.c. of blood taken from the heart of Horse No. XL nine and a half hours *post mortem*. On the following morning an eruption of Urticaria broke out and persisted for thirty-six hours and then commenced to fade, *i.e.*, five days previous to the first appearance of the organism in the blood. The *latent* period occupied seven days. The temperature remained sub-normal and normal the whole time, varying between 35·3°C. and 37·3°C. The pathological lesions were slight.

Horse No. XLVI.—Vide *Rat Surra, Vol. II.*

Horse No. XLVIII.—Vide *Rat Surra, Vol. II.*

Horse No. L.—Was inoculated subcutaneously on the 15th October 1891 with 2·0 c.c. of blood serum taken from the Internal Jugular Vein of Horse No. XXXVIII, forty-five minutes *post mortem*. There was a gradual rise in the temperature until the evening of the fifth day following inoculation and by the evening of the sixth day rose a further 2·5°C., attaining 40·9°C. It then gradually fell until the first appearance of the organism in the blood which occurred on the morning of the tenth day, or nine days after inoculation. The *fever* then became continued with irregular periods of intermission until death, which occurred on the twentieth day of the disease, the hæmatozoon having been absent three days. Sub-endocardial lesions were found invading the right ventricular walls of the heart but were absent from the left, and a tumefied and congested condition of the Schneiderian membranes in the nasal passages.

Horse. No. LIV.—Chestnut Country-Bred Horse, aged. Subcutaneously inoculated on the 26th December 1891 with 0·1 c.c. of blood swarming with hæmatozoa taken from the Jugular Vein of Horse No. LVI *ante mortem.* On the day following the operation a small raised tumor appeared at the seat of inoculation, which continued to increase in size until the morning of the fourth day when, on manipulation, the animal showed signs of uneasiness. On passing a Pravaz needle into the tumor and on microscopical examination of the blood-stained fluid withdrawn, several hæmatozoa were observed, but no organism were found in the blood of the general circulation. On the following day the part became flaccid and the tenderness disappeared, and on examination of the blood hæmatozoa were discovered in small numbers. The *latent* period occupied four days. The temperature at the time of inoculation registered 35·8°C., but the same evening rose to 37·4°C., and from that date until the fourth day of the disease the fever assumed a remittent type, characterized by midday exacerbations and morning remissions. On the morning of the fifth day the temperature suddenly fell 4·6°C. Then followed a period of apyrexia, lasting four days. This paroxysm being followed by four similar ones, marked by gradual rises to 41°C. or 42°C. in the evening, but on the last occasion the maximum was attained at midday, and these were followed by sudden falls in the temperature during the night of from 2·1°C. to 4·6°C., and subsequently by fever-free periods of three to four days. During the last fifteen days of the animal's life the thermometric curves demonstrated a return to the continued type of fever accompanied by daily remissions. Death occurred on the 6th February 1892.

Autopsy.—Emaciation, œdema of the extremities and under-surface of abdomen. *Lungs.*—Few sub-pleural ecchymoses, tissues stained yellow. *Heart.*—Sub-pericardial extravasations, yellow-coloured, gelatinous exudation round the base of the organ, large sub-endocardial extravasations involving the musculi papillares in the left ventricle. *Spleen* enlarged, sub-capsular petechiæ. *Liver* enlarged. *Intestines* presented numerous small extravasations lying beneath the mucous membrane, with here and there patches of congestion, but no ulceration or parasites.

Horse No. LV.—Grey Country-Bred Entire, aged. Subcutaneously inoculated on 5th February 1892, with 0·1c.c. of blood swarming with hæmatozoa taken from the Jugular Vein of Horse No. LIV *ante mortem.* A raised tumor appeared one inch in diameter on the day following the operation and gradually increased until the fourth day, when it became stationary in size but was accompanied by the usual symptoms. On the morning of the seventh day the tumor presented a soft and flaccid appearance and the hæmatozoon was found present in the blood of the general circulation. The *latent* period occupied six days. Previous to inoculation the temperature presented marked daily remissions and exacerbations which continued until the third day when they became much less marked, although the degree registered each day attained the normal limit. On the day previous to the appearance of the hæmatozoon in the blood there was a sudden rise from 37·4°C. to 40°C. followed by the continued type of fever with marked daily remissions until the evening of the fifth day of the disease when 41·6°C. was registered. A fall of 3·5°C. followed with a fever-free period of two days duration. Two exacerbations attaining a maximum of 42°C. and 41·7°C. occurred on the evenings of the 9th and 15th days of the disease with subsequently free periods. The last ten or eleven days previous to death, which occurred on March 10th, the continued type of fever returned accompanied with marked remissions.

Autopsy.—Emaciation, œdema of the extremities. *Pericardium* contained several ounces of clear, orange-coloured fluid. Gelatinous exudation round the base of the heart; slight thickening of the endocardial lining in the ventricles and a few ecchymoses in the left auricle. *Stomach* presented a healthy appearance. *Liver* enlarged. *Spleen* enlarged, a few sub-capsular ecchymoses. *Kidneys* presented a healthy appearance as also the mucous lining of the intestines. No parasites.

Horse No. LVIII.—Vide under heading of *Rat Surra, Vol. II.*

Horse No. LIX.— Country-Bred Entire, aged. Subcutaneouly inoculated on the 3rd of May 1892 with 0·5 c.c. of blood containing numerous hæmatozoa drawn from the Jugular Vein of Horse No. LVIII *ante mortem.* No change took place at the seat of inoculation until the fourth day when a small raised tumor, one inch in diameter, was observed and increased until the fifth day when it measured 3·5″ × 2″, at 1 P. M. On the sixth day the tumor became flaccid, &c., and a few hæmatozoa were found in the blood of the general circulation. The *latent* period occupied five days. The fever was of the continued type accompanied by remissions but by no intermission, and persisted from the first day of the disease until death on the 20th May, the 13th day of the disease.

Autopsy.—Emaciation, gelatinous exudation in quantity on the under-surface of the belly; sub-pleural ecchymoses, yellow staining of the tissues of the lungs. *Pericardial* fluid, few ounces of a dark-yellow colour. *Heart,* base surrounded by orange gelatinous exudation; sub-pericardial ecchymoses, sub-endocardial extravasations well marked in the right ventricle but few in the right auricle and left ventricle and absent from the left auricle. *Stomach* healthy. *Liver* enlarged, seat of old perihepatitis, also calcareous bodies invaded the tissues. *Spleen* very much enlarged, numerous sub-capsular petechiæ. *Kidneys,* few petechiæ on the cortical surface which dipped into the tissues of the organs. *Intestines* presented a normal appearance.

Horse No. LXIV.—Grey, Country-Bred Pony, aged. Subcutaneously inoculated on the 14th June 1892 with 0·5c.c. of blood containing a few hæmatozoa taken from the left Jugular Vein of Horse No. LXV *ante mortem.* A small raised tumor appeared at the seat of inoculation accompanied by the usual symptoms, which continued to increase until the seventh day after the injection of the blood. On the morning of the eighth day the tumor which lately had been tense and tender then appeared flaccid and soft and the hæmatozoa were found to be very numerous in the blood of the general circulation. The *latent* period occupied seven days. There was a sudden rise of temperature on the first day of the disease from 37·6°C. to 40·3C. which reached 41·1°C. on the fourth day. From the latter date until the 17th day, on which death took place, the temperature assumed the continued type marked by daily remissions but no intermission. The hæmatozoon was not absent from the blood from its first appearance in the blood until death on the 7th July, or 17th of the disease.

Autopsy.—Emaciation, œdema of the extremities; localized emphysema of the apices of the lungs. *Pericardium* contained three ounces of fluid. *Heart,* base surrounded with yellow-coloured exudation, few petechiæ. Left ventricle contained a few sub-endocardial extravasations on the musculi papillares. *Liver,* old perihepatitis, few yellow concretions. *Spleen,* enlarged, sub-capsular petechiæ. *Stomach* normal, except *Spiroptera megastoma* tumor. *Kidneys,* Small and large intestines, healthy.

PART III.

EXPERIMENTAL CASES.

Other Animals.

Donkey I.—This animal was in fair condition, but aged. Subcutaneously inoculated at 5-30 P. M. on the 9th February 1893 with 2·0c.c. of blood containing numerous hæmatozoa taken from the Jugular Vein of Horse No. LXXXIV immediately after death. On the third day after the injection of blood a small swelling was noticed on manipulation at the seat of inoculation. The *latent* period occupied 3½ days, the hæmatozoon having been discovered in the blood on the morning of the 13th February. The temperature remained normal and sub-normal until the morning of the second day of the disease when it gradually became elevated and reached a maximum of 41°C. on the evening of the

4th day. On the evening of the 5th day it registered 40·6°C., but from this time until the morning of the 9th day, upon which death took place, the temperature gradually fell and was 35°C.

Autopsy.—Body fairly nourished, absence of swelling and œdema from the extremities and under-surface of the abdomen. *Thorax.*—No fluid in the pleural cavities and no pleuritic adhesions. *Lungs.*—Sub-pleural extravasations of blood invading right organ but more numerous on left. *On section*—Tissues healthy. Cavity of the *pericardium* devoid of fluid. *Heart.*—Free from sub-pericardial and sub-endocardial extravasations. Valves healthy. *Liver.*—Numerous sub-capsular petechiæ. *On section*—Tissues presented a nutmeg change. *Spleen.*—Large, sub-capsular petechiæ. Tissues, firm. *Kidneys.*—The right was lying surrounded by jelly-like exudation and both presented numerous dark-coloured sub-capsular petechiæ involving the cortical portion of the organs. *Stomach.*—*Villous* portion the seat of a *Spiroptera* tumour 1·5″ in diameter. *Small Intestines.*—Localized extravasations. *Large Intestines.*—Few small extravasations. *Bladder* presented a healthy appearance.

Bull.—Deccani-bred.—This animal was kept under observation for some time, during which it appeared quite healthy. It was subcutaneously inoculated on 24th March 1891 with 1·75 c.c. of blood, containing numerous Surra hæmatozoa taken from the left Jugular Vein of Horse No. XIX. On the evening of the 28th March the temperature rose to 39·7°C. and on the following morning one hæmatozoon was discovered on microscopical examination after searching through several specimens of blood. On the 30th no hæmatozoa were found in the blood, but on the 31st and 1st April a few were observed; from this date until the 17th of June no more hæmatozoa or their immature forms were seen although carefully searched for. On June 17th, eighty-five days after the inoculation of the animal, two Guinea-pigs were inoculated subcutaneously with 0·2 c.c. No. I Guinea-pig developed hæmatozoa in the blood on the 27th, ten days after inoculation, whilst No. II Guinea-pig did not develop any until the 5th July, or eighteen days after inoculation. The organisms were present off and on in the blood of these small animals for a considerable period. No. I finally succumbing to the disease on the 8th of November 1891 or 144 days after its inoculation, whilst No. II died on the 12th October 1891, or 117 days after inoculation. During the interval which elapsed between the 17th June and 3rd September 1891, no hæmatozoa were discovered in the blood of the bull, although several coverglass specimens of it were examined every day. Consequently two more Guinea-pigs were inoculated. These were distinguished as No. III and No. IV and each received 0·2 c.c. of blood from the bull on the 163rd day after its inoculation. Nos. III and IV Guinea-pigs both developed hæmatozoa on the 10th day, and the organisms remained almost constantly present in their blood until the day of their death, 24th October and 14th December respectively.

On 13th November 1891, that is, 234 days after the inoculation of the bull, two Guinea-pigs Nos. V and VI were inoculated with 0·2 c.c. of blood from that animal, but as no hæmatozoa were found during the next 32 days, they were re-inoculated on the 16th December 1891, 267 days after inoculation of the bull, but with negative results a second time. Between the latter date, 16th December 1891, and 14th March 1892, the bull appeared to be enjoying good health and putting on flesh. On this latter date, that is, 356 days from the time of inoculation, two new Guinea-pigs Nos. VII and VIII were inoculated as previously with 0·2 c.c. of blood from the bull, but this experiment was also followed by negative results. Since 24th March the bull has been in very fine condition, and as it was desirable to ascertain whether animals of the bovine species are liable to a second attack of Surra, it was resolved to re-inoculate this animal with a more virulent type of Surra obtained by passing the hæmatozoon of the rat (Mus decumanus) through the horse and donkey. This second inoculation was performed on 22nd August 1892, when 1·0c.c. of blood drawn from the Internal Jugular Vein of the donkey, was subcutaneously injected over the left scapular region, the blood at the time containing very numerous and active hæmatozoa. On the 28th of the same month a peculiar organism was found in the blood, but on that day only, which will be hereafter described. The animal put on flesh and appeared in robust health. On 21st September two Guinea-pigs were inoculated with blood drawn from the

Jugular Vein, but up to the 14th November their blood which had been examined daily failed to show any signs of the Surra hæmatozoon.

No. I. Guinea-pig.—Subcutaneously inoculated on 17th June 1891 with 0·2c.c of blood taken from the bull, eighty-five days after the latter's inoculation from the horse. The *latent* period occupied *ten* days. The temperature rose over a degree and a half on the evening of inoculation and remained between 40°C. and 40·6°C. until the evening of the fifth day, when it fell to 38·4°C. From the first the *fever* assumed the continued type accompanied by remissions and exacerbations and by irregular intermissions at short intervals, during the first few weeks, but became far less frequent during the latter half of the time during which the animal lived. Death occurred on the 8th November, the 135th day of the disease.

Autopsy.—Body emaciated. *Lungs* the seat of a localized emphysema, posterior two-thirds of anterior lobes of the right lung consolidated. *Spleen* enlarged five times normal size. The other organs presented a healthy appearance.

No. II. Guinea-pig.—The fellow of No. I inoculated in an exactly similar way to the former; presented a *latent* period of *eighteen* days. The temperature curve for the first five days after inoculation was almost a facsimile of that presented by No. I Guinea-pig. From the first the *fever* assumed the continued type accompanied by daily remissions and exacerbations, and by intermissions occurring at short intervals during the first few weeks, but becoming much less frequent as the case advanced. Death occurred on the 12th October, the 100th day of the disease.

Autopsy.—Body emaciated. Pleural cavities filled with pus. Emphysema—Anterior half of the anterior lobe of both lungs consolidated. *Spleen* enlarged to three times normal size. The other organs presented a healthy appearance.

No. III Guinea-pig.—Subcutaneously inoculated on the 3rd September 1891, with 0·2 c.c. of blood taken from the bull one hundred and sixty-three days after the inoculation of the latter from the horse. The *latent* period occupied nine days. The *fever* was of the continued type accompanied by almost daily remissions and exacerbations and by intermissions at frequent intervals. Death occurred on the 24th October, the 43rd day of the disease.

Autopsy.—Body emaciated. *Lungs,* localized emphysema at the apices, œdema of the posterior lobes. *Liver* enlarged, old perihepatitis. *Spleen* enlarged to three times its natural size. *Stomach* healthy. *Kidneys* ditto.

No. IV Guinea-pig.—the fellow to No. III. Subjected to exactly the same conditions as those described under the former. The *fever* was of the continued type, accompanied by daily remissions and exacerbations, and by frequent intermissions. Death occurred on the 14th December, the 94th day of the disease.

Autopsy.—Body emaciated. *Lungs.*—The apices, the seat of a localized emphysema. *Spleen* enlarged. *Liver* and *Kidneys,* apparently healthy.

Sheep No. I.—A young country-bred ram, was inoculated subcutaneously with 0·8c.c. of blood containing a few hæmatozoa taken from the Jugular Vein of Horse No. VII. The hæmatozoon being still absent from the blood fourteen days later, the animal was reinoculated with 1·0c.c. of blood containing a few organisms from the Jugular Vein of Horse No. VI. On the twenty-eghth day after the re-inoculation, fluid was observed to be present in the right tunica vaginalis testis and on the forty-fifth day, there was in addition a discharge of muco-purulent material from the right nostril. The hæmatozoon was absent from the nasal fluid, but present in that drawn from the tunica vaginalis on the same date. It continued to be absent, however, from the blood. On the 104th day after the re-inoculation, the animal presented symptoms of loss of power on the left side of the body, involving both fore and hind limbs, but it could walk for a short distance without falling.

On the eighteenth day after re-inoculation, as the hæmatozoon had not been discovered in the blood, it was decided to inoculate two Guinea-pigs with blood from the animal, in order to prove whether the organism existed in any form in the general circulation. This accordingly was done and each animal received subcutaneously 0·7c.c. of blood drawn from the ear of the sheep. In the case of one Guinea-pig the hæmatozoon appeared in the blood in ten, and in the other after an interval of fourteen days. Eventually death took place in the former after fifty-eight days, and in the latter one hundred and thirty-nine days after inoculation.

The temperature steadily rose on the evening of the inoculation, and on the sixth day the maximum observation during the whole course of the case was registered, namely 41·9°C. The animal died on the 127th day after inoculation; a continued fever with more or less daily remissions and exacerbations was present, but with these exceptions, on the morning of the 30th December and on the 14th and 15th of April, the temperature never fell below 40°C. and it was 40·9°C. at death.

Autopsy.—Body somewhat emaciated. Frothy fluid in the trachea. Localized emphysema at the apices of both lungs. *Brain*, vessels congested, and the convolutions flattened. Both lateral ventricles contained fluid, the right much larger, and contained more fluid than the left; substance of right hemisphere considerably thinned by the pressure of the contained fluid. Other organs presented a healthy appearance.

Guinea-pig No. 1 (*sheep*).—Subcutaneously inoculated on the 24th January 1891, with 0·7c.c. of blood, from which the hæmatozoon was absent, removed from Sheep No. 1. The *latent* period occupied ten days. The *fever* was of an intermittent type during the first three weeks, but there was continued *fever* during the last five weeks of the disease. Death occurred on 23rd March 1891, on the 49th day of the disease.

Autopsy.—Body somewhat emaciated. *Lungs* general emphysema, a few petechiæ dotted over the surfaces of the organs. *Heart* distended with firm clot, presented numerous ecchymoses dotted over the surface of the organ, but lying beneath the pericardium. *Liver* large. *Kidneys* the external cortical surfaces dotted over with small petechiæ. *Spleen* much enlarged, ten times normal size. *Bladder* healthy.

Guinea-pig No. II (*sheep*).—Subcutaneously inoculated as in case No. I. The *latent* period occupied fourteen days. The *fever* was peculiar in this case owing to the fact that it was present from the first day of the disease until the morning of the tenth. From the evening of the tenth day until the morning of the twenty-first was occupied by an intermission, with normal and sub-normal temperatures. Whilst from the 21st day to the one hundred and twenty-sixth continued fever prevailed with only two occasions on which the temperature touched 39°C. Death occurred on the 12th June 1891, the 126th of the disease.

Goat No. I.—Subcutaneously inoculated on 4th November 1890, with 0·5c.c. of blood swarming with organisms, taken from the Jugular Vein of Horse No. II *ante mortem*. The *latent* period occupied six days. The temperature rose from 40°C. on the day previous to, and registered 42·2°C. on the morning, when the hæmatozoon first appeared in the blood. After this date the *fever* became of the continued type with daily remissions and by intermissions at frequent intervals during the first seventeen days, but from the latter date until death on the 53rd day, with the exception of one on the 43rd day, the intermissions were entirely absent. Death occurred on 1st January 1891.

Autopsy.—Body emaciated. *Lungs.*—Yellow-coloured exudation at both apices and superior surfaces; the different lobes were more or less agglutinated by lymph. Emphysema at the upper portions of the organs, right base deep red in colour, and somewhat firm, but not consolidated. The cavity of the peritoneum contained some ten ounces of fluid. Omentum petechiated, especially on the left side. Hydatid cyst attached. *Spleen* enlarged, perihepatitis. *Kidneys* presented numerous calcareous bodies imbedded in the cortical portion. *Testicle.*—One ounce of fluid drawn off from the right tunica vaginalis; on section the left testicle presented a localized patch, the seat of an inflammatory change. *Brain.*—The cavity of the lateral ventricles much enlarged, forming one end distended with fluid. Hemispheres only represented by a thin layer of brain substance, an eighth of an inch in thickness.

Goat No. II.—On two successive days, May 9th and 10th, 1891, one cubic centimetre of blood containing numerous hæmatozoa was given by the mouth, followed by a third dose of minims xx on the 15th June. The blood remained normal and no symptoms supervened until the early part of October, when the animal made a noise resembling the cry of a hydrocephalic child. At a later date the animal vomited and fell with a cry becoming unconscious for some minutes; these attacks became more frequent and death occurred on the 11th of November 1891.

Autopsy.—Thoracic and abdominal organs appeared healthy. On opening the cranium, the animal was found to be the subject of Hydatido-cephalus or "Gid," due to the presence of the "Cœnurus cerebralis."

Goat No. III.—Two years of age. Subcutaneously inoculated on 4th June 1891, with 1·0 c.c. of blood which contained the hæmatozoa (swarming) taken from the heart of Horse No. XXI. five and a quarter hours *post mortem.* The *latent* period occupied six days.

The *fever* was of the continued type, accompanied with daily remissions and exacerbations, from the ninth day to the one hundred and fifty-second day of the disease, and was marked by intermissions on the 12th, 32nd, 46th, 49th, and 134th days of the disease. The hæmatozoon was present off and on in the blood for fifteen days, after this it was absent for twenty-six days. From this time until death the organism was always absent from the blood, but excepting the last 10 days was present in the fluid drawn from the tunica vaginalis.

Autopsy.—Body emaciated. *Liver* perihepatitis. *Stomach,* healthy. *Kidneys* ditto. *Spleen* attached to stomach by firm bands of organised lymph. *Testicles* hard, and cord thickened. *Brain,* convolutions flattened, lateral ventricles dilated with colourless fluid.

RABBITS.

Two adult animals were subcutaneously inoculated on November 2nd, 1890, with 0·3 c.c. of blood which contained very numerous hæmatozoa taken from Horse No. II.

No. 1.—The *latent* period occupied five days. Continued *fever* was present with remissions but only one intermission on the 29th day of the disease, from the day previous to the appearance of hæmatozoa in the blood until death.

Autopsy.—Body emaciated, the integument surrounding eyes, nose and mouth swollen and the seat of solid œdema. Yellow-creamy pus exuding from the nostrils and eyes. *Lungs* the seat of localized patches of emphysema. *Heart* presented a healthy appearance. *Stomach* mucous membrane thickened, otherwise normal. Other organs healthy.

No. II.—The *latent* period occupied *nine* days. Continued *fever* with daily remissions and exacerbations was present from the sixth day after inoculation to the 31st day of disease, on which day there was an intermission followed by a second intermission on the 35th, lasting 48 hours; death followed on the 37th day of the disease, 21st December 1890.

Autopsy.—Body emaciated, localized emphysema of the *lungs.* The other organs presented a healthy appearance.

GUINEA-PIGS.

Two were subcutaneously inoculated on 2nd November 1890; each received 1·0 c.c. of blood containing very numerous hæmatozoa taken from Horse No. II *ante mortem.*

No. I.—The *latent* period occupied eleven days. There was continued *fever* with remissions during a period of forty-one days, from the fourth day of the disease until death, whilst slight intermissions occurred at irregular intervals. Death occurred on the 27th December, the 45th day of the disease.

Autopsy.—Body fairly well nourished. *Lungs* presented circumscribed patches of emphysema, and several sub-pleural petechiæ. *Liver,* enlarged, gall bladder distended with a clear fluid. *Spleen,* enlarged, weighed seven grammes. *Stomach* contained some grumous blood and slight ulceration near the pyloric end of the organ.

No. II.—The *latent* period occupied nine days. From the evening of the first day of the disease until that of the fourteenth day, the temperature was marked by slight exacerbations at night with remissions in the morning; afterwards from the latter date until the evening of the eighty-sixth day the fever was of the continued type from which intermissions were entirely absent. Death occurred on the 7th of February 1891, the 89th day of the disease.

Autopsy.—Localized emphysema of the lungs. *Spleen* small. The other organs presented a healthy appearance.

No. III.—A pregnant doe; it was subcutaneously inoculated on November 24th 1890, with 0·5 c.c. of blood containing very numerous hæmatozoa taken from the Jugular Vein of Horse No. IV. Up to the 30th no organisms were found in the blood; on that date it gave birth to three young ones, one being born dead. The blood of the mother and young ones was free from the hæmatozoon. On the day following parturition, the mother's blood contained organisms, and continued to do so off and on until the date of death. The milk of the mother was examined daily, but no organisms were ever discovered in it; nevertheless on December 16th the blood of No. 1 young one contained a few hæmatozoa, but they were never discovered in that of No. II.

The mother presented a temperature indicating continued fever from the 3rd day until the 90th day of the disease, with intermissions on the 33rd, 45th, 50th, 58th and 90th days. Death occurred on the 1st March 1891, the 91st of the disease.

Autopsy.—Body emaciated. *Lungs.*—The apices were the seat of well marked localized emphysema. The right middle lobe was consolidated. *Liver* enlarged. *Stomach.*—The mucous membrane at the pyloric extremity was congested, no ulceration. *Spleen* enlarged to three times normal size. The other organs were healthy. At a later date, 4th February 1891, the two young ones were inoculated when sixty-seven days old, each with 0·2 c.c. of blood containing numerous hæmatozoa taken from Horse No. XI.

No. 1.—The *latent* period occupied six days. Death occurred on 2nd June 1891, the one hundred and eighteenth day after inoculation.

No. 2.—The *latent* period occupied six days. Death occurred on 3rd July 1891, one hundred and forty-ninth day after inoculation.

RATS.

Rat (Mus decumanus).—The blood of this animal was submitted to careful microscopical examination for a period of fourteen days, and as the hæmatozoon was not observed in it, subcutaneous inoculation was made with 0·2 c.c. of blood containing very numerous hæmatozoa from the Jugular Vein of Horse No. VII. On the *next day* a few organisms were found in the blood, which in the course of a few days increased to very numerous and swarming. The rat died on the seventh day after the inoculation, with its blood teeming with hæmatozoa.

Autopsy.—Body well nourished. All the organs with the exception of the *spleen* which was much increased in size and dark-red in colour, presented a healthy appearance.

Three rats (Mus decumanus) were selected, two full grown and one young one, on account of their blood being free from the hæmatozoon. After two days the adult animals received 0·1 c.c. of blood containing a few organisms from Horse No. VII. The small animal was not inoculated, but placed with the two others to act as a control experiment, and in order to observe whether it would contract the disease. The period which elapsed between the inoculation and the first appearance of the hæmatozoon in the blood of the adult animals was two days, and on the fifth day the organism was found in the blood of the young animal. The adult animals survived inoculation by eight days, and the young one by nine days only.

Autopsies.—In all three animals, respectively, the spleen was much enlarged and presented numerous localized patches of extravasation which had given rise to elevations on the convex surface of the organ. In one adult rat the lungs were the seat of localized emphysema.

No. 1.—*Field Rat* (Nesokia providens).—Subcutaneously inoculated, 26th December 1890, with 0·2 c.c. of blood containing numerous hæmatozoa, taken from the Jugular Vein of Horse No. VII. The *latent* period lasted two days. Death occurred on 6th January 1891, the tenth day of the disease.

Autopsy.—Thoracic viscera healthy in appearance. The *stomach* externally presented a normal appearance. *On section* a dark-red clot of blood was found near the pyloric extremity about $\frac{1}{12}$th of an inch in thickness, and extending over one-sixth of the surface of the mucous membrane. On removal of the clot, round, petechiated spots were visible on the rugæ, lying underneath the lining epithelial layer. An enlarged gland attached to the great omentum occupied a position outside and just opposite the seat of the internal hæmorrhage. *Spleen* considerably enlarged. *Kidneys* and *intestines* healthy.

Nos. 2. *and* 3.—Inoculated subcutaneously on 7th January 1891, two field rats (N. prov.); each one received 0·2 c.c. of blood containing numerous hæmatozoa taken from Jugular Vein of Horse No. VI.

No. 2.—The *latent* period occupied five days. *Autopsy.*—All the organs, with the exception of the spleen, presented a healthy appearance. *Spleen* much increased in size, but tissues firm.

No. 3.—The *latent* period occupied five days. *Autopsy.*—All the organs, with the exception of the spleen, presented a healthy appearance. *Spleen* much increased in size.

FOWLS.

Two male birds (Gallus domesticus) were subcutaneously inoculated on 7th January 1891, each receiving 0·2 c.c. of blood containing numerous hæmatozoa taken from the Jugular Vein of Horse No. VI. As no symptoms supervened and the blood presented no changes, the birds were re-inoculated on the 4th February, each receiving 0·3 c.c. of blood containing numerous hæmatozoa from Horse No. XI. These fowls were kept under careful observation and their blood examined microscopically daily until June 12th, when it was decided to subcutaneously inject a larger quantity. Consequently at 2 P.M. on that date each bird received 1·0 c.c. of blood taken from the heart of Horse No. XIII ten hours *post mortem.* No hæmatozoa appeared in their blood, and no other symptoms were observed up to the 9th July.

Results negative.

PIGEONS.

Two pigeons, a male and a female bird, were inoculated subcutaneously on 7th January 1891. Each received 0·2 c.c. of blood containing numerous hæmatozoa taken from the Jugular Vein of Horse No. VI. The blood was examined daily until February 25th, with negative results.

ANIMALS INOCULATED WITH OTHER FLUID THAN BLOOD.

URINE.—Subcutaneous inoculation of small animals with the *Urine* of Horses (in an advanced stage of Surra), in which at the time of the secretion being passed, hæmatozoa were present in large numbers in the blood.

No. 1 *Guinea-pig.*—Full grown, weight 988·0 grammes. 14th October 1891.—Temp. 1-20 P.M. 40·4°C. Subcutaneously injected 5·0 c.c. of urine slightly acid in re-action. Sp. Gr. 1,014, and containing a few granular casts, and a trace of albumen. This was a sample of the collected urine voided during the previous twenty-four hours by Horse No. XXXVIII on the 50th day after inoculation with Horse Surra blood. The hæmatozoa were swarming in the blood during the period the excretion was being collected. Following day the 5·0 c.c. injection was repeated. No toxic effects produced. One year later the animal still alive and healthy.

No. 1. *Rabbit.*—White animal, pink eyes, full grown, weight 2,145 grammes. 14th October 1891.—Injected subcutaneously 10·0 c.c. of urine from the same source as that used in the previous experiment. Slight toxic effects. October

15th, a second subcutaneous injection of 10 c.c. of urine from the same Horse was administered, with less result than observed after the previous one. October 1892. The animal is still alive and healthy.

PERICARDIAL FLUID.—Two Guinea-pigs were each subcutaneously inoculated on the 28th December 1891 with 1·0 c.c. of *pericardial fluid* taken from Horse No. LVI, thirteen hours *post mortem.*

No. 1.—The *latent* period occupied ten days. There was a rise of temperature from 38·4°C. to 40·1°C. on the day previous to the appearance of the hæmatozoon in the blood. During the whole course of the disease there were many remissions touching the normal standard with evening exacerbations. Death occurred on 25th February 1892, the 50th day of the disease.

Autopsy.—Body emaciated. *Lungs,* localized emphysema at the apices, œdema of the posterior lobes. *Liver* enlarged. *Spleen* enlarged to several times its normal size. The other organs presented a healthy appearance.

No. 2.—The *latent* period occupied ten days. A continued fever with morning remissions and evening exacerbations throughout the case. Death occurred on the 22nd February 1892, the 47th day of the disease.

Autopsy.—Body emaciated. *Lungs.*—Apices the seat of a localized emphysema. *Liver* and *Spleen* enlarged ; other organs presented a healthy appearance.

CEREBRO-SPINAL FLUID.—Guinea-pig was subcutaneously inoculated on 15th August 1891, with 0·5 c.c. of clear fluid removed from the *lateral ventricles of the brain* of Horse No. XXXIV, two hours *post mortem.* The *latent* period occupied eleven days. In this case there was continued fever accompanied by daily remissions and exacerbations for a period of fifty-five days, and intermissions lasting a short time on the first, ninth, and fourteenth days of the disease.

Autopsy.—*Lungs.*—Consolidation of both anterior lobes. *Spleen* enlarged to several times the normal size. The other organs presented a healthy appearance.

TABLE I.

NATURALLY ACQUIRED SURRA CASES.

Number.	Kind of Animal inoculated.	Fluid used for the purpose of Inoculation.	Quantity used for the purpose of Inoculation.	Fluid used taken from what Animal.	Date of Inoculation.	How administered.	Inoculation with fluid taken *ante mortem.*	Number of Hæmatozoa present in fluid *ante mortem.*	Inoculation with fluid taken *post mortem.*	Fluid taken number of hours *post mortem.*	Number of Hæmatozoa present in fluid taken *post mortem.*	Result of Inoculation, Positive or Negative.	Date of 1st appearance of Hæmatozoa in the blood.	Number of days between Inoculation and 1st appearance of Hæmatozoa in the blood.	Result of Inoculation.	Date of death.	Days between Inoculation and Death.	Days between 1st appearance of Hæmatozoa in the blood and death.	Remarks.
I ...	Arab entire ...	...	...	...	...	Naturally acquired	...	...	...	...	...	...	14th Sep. 1890...	...	...	31st Oct. 1890...	...	47	
II ...	„ Gelding...	...	...	...	...	Do. ...	...	...	...	...	...	...	16th Sep. 1890...	...	...	4th Nov. 1890...	...	49	
III ...	„ „ ...	...	...	...	...	Do. ...	...	...	...	...	...	...	14th Oct. 1890...	...	...	10th Dec. 1890...	...	57	
X ...	C. B. Mare ...	?	...	...	...	Do. ...	...	...	...	...	...	...	......	...	...	1st Jan. 1891...	...	...	
LVI ...	Arab entire ...	?	...	...	...	Do. ...	...	...	...	...	...	...	20th Nov. 1891..	...	...	27th Dec. 1891...	...	37	
LXV ..	Aust. Mare ...	Polluted water.	...	...	...	Do. ...	...	...	...	...	...	...	23rd May 1892 ..	...	...	29th July 1892...	...	67	
LXX ...	„ Gelding...	?	...	...	...	Do. ...	...	...	...	...	...	...	23rd Sep. 1892...	...	...	19th Oct. 1892...	...	26	
LXXI ...	„ Mare ...	?	...	...	...	Do. ...	...	...	...	...	...	...	Do. ...	...	...	27th Oct. 1892...	...	34	
LXXII ...	„ Gelding...	?	...	...	...	Do. ...	...	...	...	...	...	...	7th Oct. 1892...	...	...	21st Nov. 1892...	...	45	
LXXIII ...	„ ...	?	...	...	...	Do. ...	...	...	...	...	...	...	30th Oct. 1892...	...	...	17th Feb. 1893...	...	110	
LXXIV ...	Arab Gelding...	?	...	...	...	Do. ...	...	...	...	...	...	...	7th Nov. 1892...	...	...	15th Dec. 1892...	...	38	
LXXVI ...	Australian Gelding.	?	...	...	...	Do. ...	...	...	...	...	...	...	25th Nov. 1892...	...	...	4th Jan. 1893...	...	40	
LXXVII ...	Persian Gelding.	?	...	...	...	Do. ...	...	...	...	...	...	...	27th Nov. 1892...	...	..	31st Jan. 1893...	...	65	
LXXVIII ...	Australian Mare.	?	...	...	...	Do. ...	...	...	...	...	...	...	6th Dec. 1892...	...	...	18th Dec. 1892...	...	12	
LXXIX ...	Australian Gelding.	?	...	...	...	Do. ...	...	...	...	...	...	...	Do. ...	...	...	22nd Dec. 1892...	...	16	
LXXX ...	Australian Mare.	?	...	...	...	Do. ...	...	...	...	...	...	...	16th Dec. 1892...	...	...	25th Jan. 1893...	...	46	
LXXXI ...	Herati Mare ...	?	...	...	...	Do. ...	...	...	...	...	...	...	18th Dec. 1892...	...	...	28th Jan. 1893 ..	...	41	
LXXXII ...	Australian Mare.	?	...	...	...	Do. ...	...	...	...	...	...	...	Do. ...	...	...	26th Feb. 1893...	...	70	
LXXXIV ...	Persian Gelding.	?	...	...	...	Do. ...	...	...	...	...	..	...	23rd Jan. 1893...	...	....	9th Feb. 1893...	...	17	

TABLE II.

EXPERIMENTAL CASES.

Number.	Kind of Animal inoculated.	Fluid used for the purpose of Inoculation.	Quantity used for the purpose of Inoculation.	Fluid used taken from what Animal.	Date of Inoculation.	How adm inistered.	Inoculation with fluid taken *ante mortem*.	Number of Hæmatozoa present in fluid *ante mortem*.	Inoculation with fluid taken *post mortem*.	Fluid taken number of hours *post mortem*.	Number of Hæmatozoa present in fluid taken *post mortem*.	Result of Inoculation, Positive or Negative.	Date of 1st appearance of Hæmatozoa in the blood.	Number of days between Inoculation & 1st appearance of Hæmatozoa in the blood.	Result of Inoculation.	Date of Death.	Days between Inoculation and Death.	Remarks.
														Days.				
XX	Horse	Blood	* ms. ccxci	Horse No. XXIII...	28th June 1891...	Gastric Ingestion.	A.M.	V.N.	...	...	...	P.	11th Sept. 1891...	75	Death ...	21st October 1891	115	
XXVI	Do.	Do.	200·cc	,, XXII...	22nd June 1891 .	Do. ...	...	V.N.	P.M.	1·6 hrs.	Absent.	N.	......	...	Do. ...	9th Nov. 1891 ...	140	
XIV	Horse	Blood	0·7cc	Horse No. XI...	30th Jan 1891...	Directly into Internal Jugular Vein.	A.M.	N.	...	...	...	P.	4th Feb. 1891...	5	Death ...	25th Feb. 1891...	26	
XV	Do.	Do.	0·8cc	,, XI...	Do. ...	Do. ...	A.M.	,,	...	...	...	P.	5th Feb. 1891...	6	Do. ...	12th March 1891.	41	
V	Do.	Do.	3·0cc	,, IV...	18th Nov 1890...	Subcut. inoc ...	A.M.	V.N.	...	...	...	P.	22nd Nov. 1890...	4	Do. ...	25th Nov. 1890...	7	
VIII	Do.	Do.	1·0cc	,, VII...	19th Dec. 1890...	Do. ...	A.M.	V.N.	...	...	...	P.	24th Dec. 1890...	5	Do. ...	11th Jan. 1891...	23	
VI	Do.	Do.	1·0cc	,, IV...	22nd Nov 1890...	Do. ...	A.M.	V.N.	...	...	...	P.	27th Nov. 1890...	5	Do. ...	10th Jan. 1891...	49	
XXII	Do.	Do.	1·0cc	,, XXI...	29th May 1891...	Do. ...	A.M.	V.N.	...	...	...	P.	2nd June 1891...	4	Do. ...	22nd June 1891...	24	
IV	Do.	Do.	1·0cc	,, III...	8th Nov 1890...	Do. ...	A.M.	Few.	...	...	...	P.	16th Nov. 1890...	8	Do. ...	2nd Dec. 1890...	24	
XXX	Do.	Do.	1.0cc	,, XXIII...	7th July 1891..	Do. ...	A.M.	F.	...	...	...	P.	14th July 1891 ..	7	Do. ...	15th July 1891...	8	
XIII	Do.	Do.	1·0cc	,, XIX...	29th Apr 1891..	Do. ...	A.M.	A.	...	...	...	P.	7th May 1891...	8	Do. ...	12th June 1891...	44	
XXI	Do.	Do.	1·0cc	,, XIX...	Do. ...	Do. ...	A.M.	,,	...	...	...	P.	Do. ...	8	Do. ...	4th June 1891...	36	
XXIX	Do.	Do.	0·8cc	,, XXIII...	7th July 1891...	Do. ...	A.M.	F.	...	...	...	P.	14th July 1891...	7	Do. ...	18th July 1891...	11	
LXIV	Do.	Do.	0·5cc	,, LXV...	14th June 1892...	Do. ...	A.M.	F.	...	...	...	P.	21st June 1892...	7	Do. ...	7th July 1892...	23	
XLVIII	Do.	Do.	0·5cc	,, L...	12th Nov. 1891...	Do. ...	A.M.	A.	...	...	...	P.	22nd Nov. 1891...	10	Do. ...	23rd Nov. 1891...	11	Hæmatozoon Absent 3 days from blood previous to inoculation.
XII	Do.	Do.	minim j	,, XIX...	5th Apr. 1891...	Do. ...	A.M.	N.	...	...	...	P.	11th April 1891...	6	Do. ...	26th April 1891 .	21	
LIX	Do.	Do.	0·5cc	,, LVIII...	3rd May 1892...	Do. ...	A.M.	N.	..	...	...	P.	8th May 1892...	5	Do. ...	20th May 1892...	17	
LIV	Do.	Do.	0·1cc	,, LVI...	26th Dec. 1891..	Do. ...	A.M.	S.	...	...	...	P.	30th Dec. 1891...	4	Do. ...	6th Feb. 1892...	42	
LV	Do.	Do.	0·1cc	,, LIV...	5th Feb. 1892...	Do. ...	A.M.	S.	...	...	...	P.	11th Feb. 1892...	6	Do. ...	10th March 1892.	34	
XXIV	Do.	Do.	A fraction of m. i	,, XXII...	15th June 1891..	Do. ...	A.M.	V.N.	...	...	...	P.	22nd June 1891...	7	Do. ...	6th July 1891...	21	

* This means minims 291.

TABLE III.

EXPERIMENTAL CASES.

Number.	Kind of Animal inoculated.	Fluid used for the purpose of Inoculation.	Quantity used for the purpose of Inoculation.	Fluid used taken from what Animal.	Date of Inoculation.	How administered.	Inoculated with fluid taken *ante mortem.*	Number of Hæmatozoa present in fluid *ante mortem.*	Inoculated with fluid taken *post mortem.*	Fluid taken number of hours *post mortem.*	Number of Hæmatozoa present in fluid taken *post mortem.*	Result of Inoculation, Positive or Negative.	Date of 1st appearance of Hæmatozoa in the blood.	Number of days between Inoculation, and 1st appearance of Hæmatozoa in the blood.	Result of Inoculation.	Date of Death.	Days between Inoculation and Death.	Remarks.
														Days.			Days.	
XVIII	Horse	Blood	2·0cc	Horse No. XV	12th March 1891.	Subcutaneously inoculated.	...	N.	P.M.	10 hrs.	A.	P.	25th March 1891	13	Death	22nd April 1891	41	
XIX	Do.	Do.	2·0cc	Do. XV	Do.	Do.	...	N.	P.M.	10 hrs.	A.	P.	21st March 1891	9	Do.	15th May 1891	64	
XXVII	Do.	Do.	2·0cc	Do. XXX	16th July 1891	Do.	...	V. N.	P.M.	16 hrs.	A.	P.	27th July 1891	11	Do.	29th July 1891	13	
LVIII	Do.	Do.	1·0cc	Do. XLVII	29th March 1891.	Do.	...	S.	P.M.	5 hrs.	A.	P.	7th April 1891	9	Do.	3rd May 1891	35	
XXIII	Do.	Do.	1·0cc	Do. XXI	4th June 1891	Do.	...	S.	P.M.	5·5 hrs.	A.	P.	12th June 1891	8	Do.	11th July 1891	37	
XLVI	Do.	Do.	1·0cc	Do. XLVIII	23rd Nov. 1891	Do.	...	N.	P.M.	8·5 hrs.	A.	P.	1st Dec. 1891	8	Do.	7th Dec. 1891	14	
XI	Do.	Do.	1·0cc	Do. VIII	11th Jan. 1891	Do.	...	V. N.	P.M.	10·5 hrs.	A.	P.	22nd Jan. 1891	11	Do.	25th Feb. 1891	45	
XXXII	Do.	Do.	0·3cc	Do. XXIII	11th July 1891	Do.	...	V. N.	P.M.	8 hrs.	A.	P.	20th July 1891	9	Do.	21st July 1891	10	
VII	Do.	Serum	1·0cc	Do. III	10th Dec. 1890	Do.	...	N.	P.M.	2 hrs.	A.	P.	18th Dec. 1890	8	Do.	27th Dec. 1890	17	
XXIII	Do.	Serous fluid tunica vaginalis testis.	1·0cc	Goat No. III	25th July 1891	Do.	A.M.	N.	...	...	...	P.	30th July 1891	5	Do.	16th August 1891.	22	
XXXIV	Do.	Blood	1·0cc	Horse No. XXXI	2nd August 1891.	Do.	A.M.	N.	...	...	...	P.	14th August 1891.	12	Do.	15th August 1891.	13	
XXXVIII	Do.	Do.	1·0cc	Do. XL	26th August 1891.	Do.	...	V. N.	P.M.	9·5 hrs.	A.	P.	4th Sept. 1891	9	Do.	16th Oct. 1891	51	
XLI	Do.	Do.	1·0cc	Do. XL	Do.	Do.	..	V. N.	P.M.	9·5 hrs.	A.	P.	2nd Sept. 1891	7	Do.	3rd Sep. 1891	8	
XL	Do.	Do.	0·6cc	Do. XXXIV	15th August 1891.	Do.	..	V. N.	P.M.	1·25 hrs.	A.	P.	21st August 1891.	6	Do.	26th August 1891.	11	
XXXI	Do.	Do.	0·3cc	Do. XXXIII	11th July 1891	Do.	...	S.	P.M.	8 hrs.	A.	P.	20th July 1891	9	Do.	2nd August 1891.	22	
L	Do.	Blood serum	2·0cc	Do. XXXVIII.	15th Oct. 1891	Do.	..	S.	P.M.	0·75 hrs.	A.	P.	24th Oct. 1891	9	Do.	12th Nov. 1891	28	

TABLE IV.

EXPERIMENTAL CASES.

Number.	Kind of Animal inoculated.	Fluid used for the purpose of Inoculation.	Quantity used for the purpose of Inoculation.	Fluid used taken from what Animal.	Date of Inoculation.	How administered.	Inoculated with fluid taken *ante mortem*.	Number of Hæmatozoa present in fluid *ante mortem*.	Inoculated with fluid taken *post mortem*.	Fluid taken number of hours *post mortem*.	Number of Hæmatozoa present in fluid taken *post mortem*.	Result of Inoculation, Positive or Negative.	Date of 1st appearance of Hæmatozoa in the blood.	Number of days between Inoculation and 1st apperance of Hæmatozoa in the blood.	Result of Inoculation.	Date of Death.	Days between Inoculation and Death.	REMARKS.
I	Donkey.	Blood	2·0cc	Horse LXXXIV	9th Feb. 1893	Subcutaneously inoculated.	...	N.	P. M.	Immediately.	N.	P.	13th Feb. 1893	Days. 4	Death.	21st Feb. 1893	Days. 12	
I	Bull	Do.	1·75cc	Do. XIX	24th Mar. 1891	Do.	A.M.	N.	...	...	...	P.	29th Mar. 1891	5	...	......	...	Re-inoculation with donkey's blood, 22nd August 1892.
(i).	Guinea Pig.	Do.	0·2cc	Bull No. I	17th June 1891	Do.	A.M.	Absent.	...	...	...	P.	27th June 1891	10	Death	8th Nov. 1891	144	
(ii).	Do.	Do.	0·2cc	Do.	Do.	Do.	A.M.	Do.	...	...	..	P.	5th July 1891	18	Do.	12th Oct. 1891	117	
(iii).	Do	Do.	0·2cc	Do.	3rd Sept. 1891	Do.	A.M.	Do.	...	...	...	P.	12th Sept. 1891	9	Do.	24th Oct. 1891	51	
(iv).	Do.	Do.	0·2cc	Do.	Do.	Do.	A.M.	Do.	...	...	...	P.	Do.	9	Do.	14th Dec. 1891	102	
(v).	Do.	Do.	0·2cc	Do.	13th Nov. 1891	Do.	A.M.	Do.	...	...	...	N.	......	...	...	......	...	Re-inoculation, 16th December 1891, with bull's blood. Result negative.
(vi).	Do.	Do.	0·2cc	Do.	Do.	Do.	A.M.	Do.	...	...	...	N.	......	...	...	......	...	Do. do.
(vii).	Do.	Do.	0·2cc	Do.	14th Mar. 1892	Do.	A.M.	Do.	...	...	...	N.	......	...	...	......	...	
(viii).	Do.	Do.	0·2cc	Do.	Do.	Do.	A.M.	Do.	...	...	...	N.	......	...	...	......	...	
(ix).	Do.	Do.	0·2cc	Do.	21st Sept. 1892	Do.	A.M.	Do.	...	...	...	N.	......	...	...	......	...	Inoc. after re-inoculation of bull (30 days).
(x)	Do.	Do.	0·2cc	Do.	Do.	Do.	A.M.	Do.	...	...	...	N.	......	...	...	......	...	Do. do.
I	Sheep	Do.	0·8cc	Horse No. VII	23rd Dec. 1890	Do.	A.M.	Do.	...	...	...	P.	......	...	Death	29th April 1891	127	
(i)	Guinea Pig.	Do.	0·7cc	Sheep No. I	24th Jan. 1891	Do.	A.M.	Do.	...	...	...	P.	3rd Feb. 1891	10	Do.	23rd Mar. 1891	58	
(ii)	Do.	Do.	0·7cc	Do.	Do.	Do.	A.M.	Do.	...	...	...	P.	7th Feb. 1891	14	Do.	12th June 1891	139	
I	Goat	Do.	0·5cc	Horse No. II	4th Nov. 1890	Do.	A.M.	S.	...	...	...	P.	10th Nov. 1890	6	Do.	1st Jan. 1891	58	
II	Do.	Do.	2·3cc	Do. XXI	9th May 1891	By Gastric Ingestion.	A.M.	N.	...	...	...	N.	......	...	Do.	11th Nov. 1891	186	2·3 c.c. of blood in all.
III	Do.	Do.	1·0cc	Do. XXI	4th June 1891	Subcutaneously inoculated.	...	S.	P. M.	5·25	A.	P.	10th June 1891	6	Do.	9th Nov. 1891	158	
I	Rabbit.	Do.	0·3cc	Do. II	2nd Nov. 1890	Do.	A.M.	V.N.	...	...	...	P.	7th Nov. 1890	5	Do.	11th Dec. 1890	39	
II	Do.	Do.	0·3cc	Do. do.	Do.	Do.	A.M.	V.N.	...	...	...	P.	11th Nov. 1890	9	Do.	21st Dec. 1890	49	
I	Guinea Pig.	Do.	1·0cc	Do. do.	Do.	Do.	A.M.	V.N.	...	...	...	P.	13th Nov. 1890	11	Do.	27th Dec. 1890	55	
II	Do.	Do.	1·0cc	Do. do.	Do.	Do.	A.M.	V.N.	...	...	...	P.	11th Nov. 1890	9	Do.	7th Feb. 1891	97	
III	Do.	Do.	0·5cc	Do. IV	24th Nov. 1890	Do.	A.M.	V.N.	...	...	...	P.	1st Dec. 1890	7	Do.	1st Mar. 1891	97	Pregnant doe. Three young ones born 30th November 1890.
(i)	Do.	Do.	0·2cc	Do. XI	4th Feb. 1891	Do.	A.M.	N.	...	...	...	P.	10th Feb. 1891	6	Do.	2nd June 1891	118	
(ii)	Do.	Do.	0·2cc	Do XI	Do.	Do.	A.M.	N.	..	...	...	P.	Do.	6	Do.	3rd July 1891	149	

TABLE V.

EXPERIMENTAL CASES.

Number.	Kind of Animal inoculated.	Fluid used for the purpose of Inoculation.	Quantity used for the purpose of Inoculation.	Fluid used taken from what Animal.		Date of Inoculation.	How administered.	Inoculation with fluid taken *ante mortem*.	Number of Hæmatozoa present in fluid *ante mortem*.	Inoculation with fluid taken *post mortem*.	Fluid taken number of hours *post mortem*.	Number of Hæmatozoa present in fluid taken *post mortem*.	Result of Inoculation, Positive or Negative.	Date of 1st appearance of Hæmatozoa in the blood.	Number of days between Inoculation and 1st appearance of Hæmatozoa in the blood.	Result of Inoculation.	Date of Death.	Days between Inoculation and Death.	Remarks.
I	Rat. (M. Dec.)...	Blood	0·2cc	Horse No.	VII...	19th Dec. 1890 ...	Subcutaneously inoculated.	A. M.	V. N.	...	...	...	P.	20th Dec. 1890 ...	Days. 1	Death ...	26th Dec. 1890 ...	Days. 7	
II	Do. (do.)...	Do.	0·1cc	,,	,, ...	23rd Dec. 1890 ...	Do. ...	A. M.	F.	...	...	...	P.	25th Dec. 1890 ...	2	Do. ...	31st Dec. 1890 ...	8	
III	Do. (do.)...	Do.	0·1cc	,,	,, ...	Do. ...	Do. ...	A. M.	F.	...	...	...	P.	Do. ...	2	Do. ...	Do. ...	8	
I	Rat. (Nes. pro.).	Do.	0·2cc	,,	,, ...	26th Dec. 1890 ...	Do. ...	A. M.	N.	...	...	...	P.	28th Dec. 1890 ...	2	Do. ...	6th January 1891.	11	
II	Do. (do.).	Do.	0·2cc	,,	VI...	7th January 1891.	Do. ...	A. M.	N.	...	...	...	P.	12th Jan. 1891 ...	5	Do. ...	18th Jan. 1891 ...	11	
III	Do. (do.).	Do.	0·2cc	,,	,, ...	Do. ...	Do. ...	A. M.	N.	...	...	...	P.	Do. ...	5	Do. ...	19th Jan. 1891 ...	12	
I	Guinea-Pig ...	Pericardial ...	1·0cc	,,	LVI...	28th Dec. 1891 ...	Do. ...	...	A.	P. M.	13 hours.	A.	P.	7th January 1892.	10	Do. ...	25th Feb. 1892 ...	59	
II	Do. ...	Do. ...	1·0cc	,,	,, ...	Do. ...	Do. ...	...	A.	P. M.	Do.	A.	P.	Do. ...	10	Do. ...	23rd Feb. 1892 ...	57	
I	Guinea-Pig ...	Cerebro-spinal-fluid.	0·5cc	,,	XXXIV...	15th Aug. 1891 ...	Do. ...	...	A.	P. M.	2 hours.	A.	P.	26th August 1891.	11	Do. ...	19th October 1891	65	
I	Guinea-Pig ...	Urine	10·0cc	,,	XXXVIII...	14th Oct. 1891 ...	Do. ...	A. M.	A.	..	...	...	N.	......	...	...	......	...	
I	Rabbit	Do.	20·0cc	,,	,, ...	Do. ...	Do. ...	A. M.	A.	...	...	...	N.	......	...	...	......	...	

SECTION VI.

ETIOLOGY OF SURRA.

A.—PREDISPOSING CAUSES.

(i) *Intrinsic.*

1. *Sex*—Neither sex in themselves predispose to "Surra". Of 85 cases of naturally contracted Surra recorded, 59 were horses and 26 mares. The difference in the number referred to is attributable to the fact, that many more horses are worked than mares:—

TABLE VI.

Year.	Places.	Horses.	Mares.	Total.
1888	Bombay Tramway Company	9	5	14
	Bacteriological Laboratory	...	...	...
1889	Bombay Tramway Company	34	13	47
	Bacteriological Laboratory	...	...	...
1890	Bombay Tramway Company	1	1	2
	Bacteriological Laboratory	3	1	4
1891	Bombay Tramway Company	1	...	1
	Bacteriological Laboratory	1	...	1
1892	Bombay Tramway Company	10	5	15
	Bacteriological Laboratory	...	1	1
	Total ...	59	26	85

2. *Age.*—Table VII shows the ages of 85 cases of naturally acquired Surra which have occurred in the Bombay Presidency during the past five years. It will be seen that 39 or 45·882 per cent. occurred in animals between the ages of 5 and 9 years; that 31 or 36·470 per cent. in animals between 10 and 14 years, 13 or 15·294 per cent. between 15 and 19 years, and that 2 or 2·352 per cent. between 20 and 24 years:—

TABLE VII.

Age.	Number of cases.			Percentage.
	Horses.	Mares.	Total.	
Under 5	...	...	...	......
5 to 9	25	14	39	45·882
10 to 14	23	8	31	36·470
15 to 19	9	4	13	15·294
20 to 24	2	...	2	2·352
	59	26	85	99·998

3. *Breed.*—Table VIII shows the breed of 85 horses, the subjects of naturally acquired Surra, from which it will be seen, that out of the above number attacked, 68 or 80 per cent. were Australians, and 17 or 20 per cent. were Asiatics, the latter number being made up of 6 Arabs, 5 Persians, 3 country-breds, 2 Cabulis, and one Herati. The statistics of the Bombay Tramway Company show, that Australian horses are much more subject to contract the disease than Asiatics. In 1889 the percentage attacked at the Parel stables, where most of the cases occurred, was in the case of Australians 31 per cent. and of the Asiatics $12\frac{3}{4}$ per cent.

TABLE VIII.

Year.	Places.	Australian.	Arab.	Persian.	Country bred.	Cabuli.	Herati.	Total.	Percentage.
1888	Bombay Tramway Company ...	13	...	1	...	...	...	14	16·470
	Bacteriological Laboratory ...	...	...	...	...	...	...	...	...
1889	Bombay Tramway Company ...	39	1	3	2	2	...	47	55·294
	Bacteriological Laboratory ...	...	...	...	...	...	...	...	...
1890	Bombay Tramway Company ...	2	...	...	...	...	...	2	2·352
	Bacteriological Laboratory ...	...	3	...	1	...	...	4	4·705
1891	Bombay Tramway Company ...	1	...	...	...	...	...	1	1·176
	Bacteriological Laboratory ...	...	1	...	...	...	...	1	1·176
1892	Bombay Tramway Company ...	12	1	1	...	...	1	15	17·647
	Bacteriological Laboratory .	1	...	...	...	...	...	1	1·176
	Total ...	68	6	5	3	2	1	85	99·996
	Percentage of each kind of breed ...	80·0	7·058	5·882	3·529	2·352	1·176	99·997	

(*ii*) *Extrinsic causes depending on surrounding conditions*—

Climate.
Residence in a locality where the disease is endemic.
Months of year.
Food.
Drink.
Overcrowding.
Work.
Wounds.

1. *Climate.*—The different situations where outbreaks of "Surra" are known to have occurred, in several of them on many occasions, are alluded to under the heading of Geographical range; but it may be as well to particularize more fully, and give details concerning the air, temperature, humidity and rainfall of each locality.

The island of Bombay and the neighbouring district on the mainland, the Konkan, are two localities in India where Surra is *endemic*. These two localities from their adjacent position vary but little with regard to their climatic statistics. The average *mean temperature* of each is 80° F.; the average *rainfall* in Bombay is 75 inches, but this year, 1892, it was however the largest for forty years, viz., (123 inches), that of the Konkan 141 inches, but the relative *humidity* varies little, especially between June and the end of December, during which time most cases of this disease occur, when the average humidity is as high as 80·5 per cent.

In Burmah, we have Rangoon with an elevation of 41 feet, and Toungoo (elevation 181 feet) with a relative humidity of 78 and 76 respectively, but that existing between June and January is as high as 85 and 83 per cent; the mean maximum temperature of the year being 104° F. with an average just under 80° F, whilst the rainfall is 99 and 78 inches respectively.

At Dera Ismail Khan (elevation 571 feet) and Kohat, both on the North-Western Frontier the rainfall is small, about 8 inches, the relative humidity has a mean of about 50, the temperature varying between a mean maximum of 107° F. in June, and 72° in December. But Dera is situated on the banks of the river Indus, which is subject to extensive floods during the rainy season, when the whole neighbourhood becomes one vast lake, and at a later period on the subsidence of the waters, the land is left covered with mud.

And lastly Meerut, with an elevation of 737 feet, which has a rainfall of 28·5 inches, with a relative humidity of 57 per cent. and a mean maximum temperature of 112° F.

It will thus be seen from the foregoing details, that the localities in which Surra is endemic belong to two distinct kinds of climates. The one with a heavy rainfall, high temperature, and humid, steamy atmosphere; the other with a dry arid neighbourhood, presenting a great annual range of temperature. But in both classes of localities, inundation of land during the rains leaves the fields covered with mud at a later date, and evaporation and concentration of the water in the tanks during the hot season.*

2. *Residence in a locality where the disease is endemic.*

Table IX shows the length of residence in Bombay of eighty animals, the subjects of Surra, which have been worked out and tabulated from exact details kept by the Tramway Company. From these figures it will be observed, that the residence of the animals attacked ranged over a period of from under one year to thirteen years, and that out of this number the largest proportion, viz., 16·25 per cent. occurred in animals which had only been in the country for varying periods of under one year. Further it will be seen, that sixty-one out of the eighty cases of animals brought forward, or 76·25 per cent. succumbed within the first seven of the fourteen years under observation.

TABLE IX.

Showing the length of residence in Bombay of 80 horses from the date of purchase to that of their being attacked with Surra.

	Under 1 year.	1 year and under 2 years.	2 years and under 3 years.	3 years and under 4 years.	4 years and under 5 years.	5 years and under 6 years.	6 years and under 7 years.	7 years and under 8 years.	8 years and under 9 years.	9 years and under 10 years.	10 years and under 11 years.	11 years and under 12 years.	12 years and under 13 years.	13 years and under 14 years.	Total.
1888... ...	1	2	1	...	4	4	...	...	...	2	...	...	...	...	14
1889... ...	8	5	2	6	5	4	4	1	...	...	6	4	...	2	47
1890	1	...	...	1	...	...	...	...	...	...	...	...	...	...	2
1891... ...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	1
1892... ...	3	1	1	3	1	...	3	1	1	...	...	1	1	...	16
	13	8	5	10	10	8	7	2	1	2	6	5	1	2	80
Percentage ...	16·25	10·0	6·52	12·5	12·5	10·0	8·75	2·5	1·25	2·5	7·5	6·25	1·25	2·5	100·00

3. *Months of the year.*

Table X shows the number of cases of Surra, which have occurred in the Bombay Tramway Stables during the past five years, together with a few cases which have been received at the Laboratory Hospital from other sources, since October 1890.

From this it will be seen that out of a total of 85 cases, 84 or 98·8 per cent. occurred during the months of September, October, November and December. The remaining case, or 1·17 per cent., originated in May. Other sporadic cases, however, have come under our notice during the remaining months, but they only tend to emphasize the fact, that the disease is chiefly prevalent during the last four months of the year, and as a rule, after the end of January, few cases will be found until the last month of the rains.

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* Blanford.—Climates and Weather of India, 1889.

Table X.

Showing the month and year in which eighty-five horses were attacked with 'Surra.'

		January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
1888...	Bombay Tramway Company	...	...	...	...	...	...	...	...	...	3	4	7	14
	Bacteriological Laboratory	...	...	...	...	...	...	...	...	...	...	...	...	...
1889...	Bombay Tramway Company	...	...	...	...	...	...	...	...	3	10	24	10	47
	Bacteriological Laboratory	...	...	...	...	...	...	...	...	...	...	...	...	...
1890...	Bombay Tramway Company	...	...	...	...	...	...	...	...	...	2	...	...	2
	Bacteriological Laboratory	...	...	...	...	...	...	...	...	2	1	...	1	4
1891...	Bombay Tramway Company	...	...	...	...	...	...	...	...	1	...	...	...	1
	Bacteriological Laboratory	...	...	...	...	...	...	...	...	...	...	1	...	1
1893...	Bombay Tramway Company	...	...	...	...	...	...	...	...	5	2	3	5	15
	Bacteriological Laboratory	...	...	...	...	1	...	...	...	...	...	...	...	1
		...	...	...	...	1	...	...	...	11	18	32	23	85
		...	...	...	...	1·176	...	...	...	12·941	21·176	37·647	27·058	99·998

4. *Eating grass and sedgy vegetation grown on low-lying and marshy ground.*

It is not usual for the natives of India to make any provision in the form of hay or dried grass for the maintenance of their animals. The general custom is to cut grass from the jungles and wastes as it is required. This being the case it is generally impossible to be certain where it is obtained. Towards the end of the hot weather grass on the higher lands has become burnt up, and it is then impossible in most instances to obtain a sufficient quantity; at lower levels, however, especially at the bottoms of nullahs, swamps, ponds, &c., where water has been lying till a much later period, an abundant supply can generally be found, and it is from these sources that the grass-cutters procure it. The conditions under which the water in these swamps, ponds, &c., gradually evaporates, containing, as they do, large quantities of organic matter, and becoming almost putrid before finally disappearing, are those favourable for the development of Infusoria, and it is most probable that in such situations the "Trypanosoma Evansi" or its resting form finds a suitable habitat. The grass and herbage springing up through this semiputrid water must necessarily bear on its surface numerous forms of organic life, and amongst them doubtless that of the Surra Infusorian.

Similar conditions operate during the wet season or immediately following it, especially in those parts of India where the temperature is high immediately after the rains cease. The lands bordering on rivers and streams, or those which are low-lying become flooded, the herbage is covered with water, which in some cases, when the land possesses a clayey subsoil, disappears almost entirely by gradual evaporation, and such places are favourable for the development of low forms of animal life, and possibly for the Surra organism. Animals, therefore, which daily consume grass from such localities, run a risk of taking into their systems the contagium of this disease.

5. *Drinking water from stagnant pools and wells, particularly at certain times of the year.*

It is a well established fact that numerous Entozoa, &c., gain an entrance into the system of persons drinking impure water, such for instance as the *distoma hepaticum*, the eggs of which are developed in water, or the *ascris lumbricoides*, as in Burmah in 1883, when at Moulmein an epidemic form of the disease was assumed during the wet season, by contamination of the shallow wells by surface drainage. The *Dochmius duodenalis*, according to Griesinger* produced in Egypt in 1854 anæmia, liver disease, and dysentery, when introduced by impure water.

The *oxyuris vermicularis*, probably taken through water (Aitkin)† and the *Filaria sanguinis hominis* according to Lewis.‡

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* Griesiner—Archives fur Phys Heilk, 1854.

† Aitkin—Practice of Medicine, volume 1, page 183.

‡ Lewis.

It is therefore an easy matter to imagine that Infusoria, which are the natural inhabitants of all streams and tanks, can, and must be taken in by man and beast. As the hot season advances in India, these and other forms of life become densely packed in all stagnant pools and wells, owing to the rapid evaporation and the constant withdrawal of water therefrom, but they nevertheless scarcely ever cease to increase and multiply. Consequently animals watered at such spots take in repeated doses of the organisms.

In support of the question of well water being one of the most important factors in the production of Surra in horses, the following notes on cases Nos. I, II, III, and LXV, are quoted :—

The horses Nos. I, II, III, were the property of a gentleman living out at Pali Hill, Bandora, near Bombay, and had been submitted to the same conditions as regards climate, locality, water and fodder, and although the cases occurred in 1890, case No. LXV, of June 1892 may be read at the same time with advantage in connection with them, as the two stables in which the cases occurred are only a few hundred yards apart. The water, which is supposed to have been the vehicle by which the contagium was carried in the two outbreaks, was obtained from wells of the same description, the water in which had become low and turbid during the hot weather. This being the case, the notes which accompany case LXV are applicable to the above three. The owner of these horses was conversant with the fact, that by supplying his animals with grass grown on low marshy ground he was running a considerable risk of introducing 'Surra' amongst them, and he had therefore, for some time previous to this outbreak, taken the precaution of obtaining all the requisite grass from as near the highest point of the surrounding hills as possible. Taking all this into consideration, it appears to be extremely probable that the well water was the means by which the disease was introduced.

Again in the case of Horse No. LXV, Mr. G. owned four horses, A, B, C, and D, which, up to March 16th, 1892, were stabled on Malabár Hill, Bombay, and drank Vehar pipe water. On March 16th, A, B, and C, were taken to Pali Hill, Mr. G. having changed his residence. D was on the same date taken to the Fort, Bombay, and has only been at Bandora for two days up to June 18th, 1892. From March 17th to April 14th, 1892, A, B, and C, were watered from two wells on Pali Hill, and no other water was supplied to them. The water in the above wells was low and rather dirty. About April 14th, 1892, the Sanitary Commissioner, after a chemical examination of the water from these two wells, pronounced it to be very bad ; the horses were therefore given from the above date until April the 26th, nothing but the Vehár pipe water described as " excellent and clear." On April 15th, A refused her food and appeared feverish. She gradually, however, got better and by April 26th appeared quite well. On April 26th A, B, and C, were taken up-country into the jungles of Dharampore States, south of Surat, on a shikár expedition, and during this time were watered at rivers and wells, mostly the former, the water not appearing to be bad. The horses did a considerable amount of work in the sun between April 26th and May 17th. A, during this period, did not eat much grass ; she ate her corn as usual however, but appeared dull and stumbled during action. Her skin felt hot, and it was several times remarked that she was not well and appeared to be losing flesh. She was not therefore worked so hard as the others. The fever was thought to be the consequence of exposure to the sun. On May 17th, A, B and C were taken back to Pali Hill, Bandora, from Dharampore. A then looked unwell and on the 19th was driven only a short distance, owing to the presence of fever. On her return she refused food and appeared to be very bad. On the 23rd of May B refused food, and an eruption broke out over the whole body, which passed away in a few days, leaving fever which continued until the 30th of the month. Between the 4th and 8th of June both horses A and B showed certain symptoms of Surra. On June 9th, the blood was examined microscopically. A's blood was free, but that of B contained a few Surra hæmatozoa. On further examination on the 10th and 11th, the blood of A was found free from hæmatozoa. On June 12th, A's condition was certainly much worse, with marked loss of flesh, œdema of the under-surface of the abdomen, the swelling extending between the fore legs, and the limbs being much swollen. On June 14th, A was shot, and buried eight feet beneath the surface of the ground. Up to the 15th June 1892, horses C and D have shown no signs of illness; also the four or five Sowars' horses, which accompanied the shikár expedition to Dharampore between the 26th of April and May 17th, and which were exposed to exactly the same influences of season and climate as A, B, and C, have remained in good health. This points to the fact, that the disease was contracted from the water of the Pali Hill wells between March 17th and April 14th, but unfortunately owing to the fact of heavy rains having fallen, and the wells becoming full, the hæmatozoon could not be found to definitely prove that this was the case, as the previously concentrated water had become so very highly diluted. There can be no doubt that A's illness commenced on April 15th, and that the first symptom noticed in B's case was the eruption of the skin.

The question of the skin eruption as a primary symptom in some cases is dealt with specially elsewhere.

The evidence brought forward in the above mentioned cases, as regards the well water *being* the vehicle of the contagium, which entered the system and produced the disease, is almost conclusive.

6. *Overcrowding.*—It is very unlikely that overcrowding can in itself have any influence one way or the other in spreading the disease. It may, however, in time weaken the animal so subjected, and render them individually more susceptible, should they at any time be exposed to the contagium. Animals, the subjects of 'Surra,' have been kept in contact with large numbers of healthy horses for varying periods, without the disease spreading, as mentioned by Evans,* when "seventy-seven horses of the 3rd Panjab Cavalry became affected with Surra at Jutta, from which they all died at Edwardesabad, but did not communicate the disease to others." Gunn† states that at the time of the outbreak among the grass-cutters' ponies at Kohat, "no mule belonging to the mountain battery, nor horse from the Panjab Cavalry became ill of the disease * * the ponies stand in the same lines, and partake of the same grain as the other animals." But one source of danger in overcrowding, is due to the presence of several kinds of flies, one of which has been mentioned by previous observers, and called by the natives on the North-Western Frontier the "burra dhang," and has been frequently observed in these stables; also a second variety, the common "cattle fly." These insect pests bite and draw blood from the animals, and I have often observed the blood trickling down their limbs; consequently these flies might be the means of conveying the soiled blood, and thus transmitting the contagium from one animal to another; the greater the overcrowding, the shorter the distance for it to be transported; but inoculation by this means according to Evans, Gunn, Steele and my own observations point to the fact that it must be very uncommon.

7. *Work.*

By far the greater number of animals, the subjects of this disease, the cases of which have been made use of in the foregoing tables, were utilized in the tram cars, and worked and fed systematically; in fact each animal performed its allotted task day by day, and no more. The stabling and every detail which concerns their management being carefully looked after, much time and attention being bestowed upon the welfare of the animals. A second series belonged to private gentlemen, who rode and drove them, and who interested themselves considerably in their animals. A third and fourth series include horses, principally country-breds, used in licensed vehicles and by the natives in the Konkan districts. These latter series no doubt were exposed to numerous dangers, by reason of their having to obtain food and water in whatever locality their calling may have taken them.

It will therefore be seen, that Surra cases occur among the valuable hunters and roadsters as well as those belonging to the ghariwalla, and that all are equally susceptible.

8. *Wounds.*—The importance of drawing attention to the presence of abrasions on the surface of the skin will be mentioned later; at present it is only necessary to note the causes in the different parts of the digestive tract.

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* Evans—page 63,

† Gunn—Op. cit.

(*a*) *Of the mouth* :—These include all breaches of the surface, by which a solution of continuity in the tissues has been brought about, whether in the mouth or on the lips; and caused by the bit, or more especially in this country, in consequence of the animals having coarse fodder to eat, as jawári (*Sorghum Vulgare*) and spear grass.

(*b*) *Of the œsophagus* :—Under this heading may be included wounds in the epithelium of the œsophagus caused by the "spiroptera scutata."

(*c*) *Of the stomach* :—The tumours found in the right sac of the stomach, with orifices on their summits, leading down into their interiors are the nests of the "*spiroptera megastoma*." Too much stress cannot be laid upon the fact, that these parasites (by the pathological condition they produce) are a source of real danger to the animal which they infest, and especially to animals, which have their habitats in a part of the country known to be within the geographical range of Surra. In the left sac, the alveoli of insertion of the *gastrophilus equi*, and the *gastrophilus hæmorrhoidalis*.

(*d*) *Of the small intestine* :—In the jejunum and ileum, large numbers of cestodes and nematodes may be found; these must continually wound the surface of the mucous membrane by their bites.

(*e*) *Of the cæcum and colon* :—These portions of the intestinal tract may be the seat of enormous numbers of parasites, of which the armed Sclerostomes (*Scl : equinum, Müller, or Strongylus armatus, Rüd.*) do a considerable amount of damage, by producing wounds on the inner surface of the intestine; the young undergo development under the mucous membrane, and when they escape, leave small holes leading into the tumours.

B.—EXCITING CAUSES.

Although it has not been absolutely proved, that the *Trypanosoma Evansi* is the 'vera causa' of Surra, owing to the fact that it has not been separated, although numerous attempts have been made, and pure cultivations of it used for inoculation in the production of the disease; nevertheless all our experiments point to the probability of its being so. The following facts go to show the intimate connection which exists between the organism and the disease.

1. No case of "Surra" naturally contracted has been observed, in which the "*Trypanosoma Evansi*" has been absent, and all previous authenticated cases, investigated by such observers as Evans, Steele, Pottinger, Gunn and Rimington tend to confirm this.

2. In all cases of the inoculated disease the organism has been present, and has comported itself in a similar manner to that which has been observed in naturally acquired cases.

3. By passing the hæmatozoon through the organisms of various animals and after a considerable time bringing it back to the horse; fatal Surra with all its distinctive characters has again been produced, without the hæmatozoon being absent in a single instance.

4. Serum of blood swarming with the organism, after having been passed through a porcelain filter, and thus deprived of any recognizable form of the hæmatozoon, does not produce "Surra"; nor is the organism ever found in the blood of the inoculated animal under these circumstances.

In addition to this we have the undoubted influence which the presence or absence of the "*Trypanosoma*" has upon the course of the disease, dividing it into its various stages, viz., paroxysms and intermissions.

It may be generally accepted that the appearance of the organism in the blood is quickly followed by a rise in the temperature, and as a rule its disappearance is soon followed by a corresponding fall. During the presence of the organism in the blood all the phenomena of a paroxysm of 'Surra' appear, whilst after its disappearance there is a very marked diminution of the severity of the symptoms. And so much is this the case, that in some instances at the commencement of an attack, an animal has been sent to work after the first paroxysm, being apparently well.

Previous observers have pointed out, that if "Surra" is contagious, it is not so in the ordinary sense of the word. Evans* found no evidence to show that the disease is either contagious or infectious in the ordinary sense." Steele † noted "that the evidence which we have to hand about the mule disease, is strongly opposed to the theory of its communicability by contagion; no contagious influence can be traced in its manner of spreading, among mules in one stable, or working together."

The chief arguments that can be brought in favour of the contagious nature or otherwise of the disease may be here noted:—

(i.) *When one horse is attacked with Surra, it often happens that other cases follow in succession in the same stable, or in the same district.*—Numerous instances of this kind are forthcoming, of which one of the most important is Evan's statistics with regard to the 4th Panjab Cavalry horses, when a total of 272 animals died in three years 1878—1880, numbers varying from 14 to 47 being attacked about the same time at several stations. Again at Tonghoo in 1884-85, one hundred and eighty-two mules were attacked between September and the following January. And in the case of the Bombay Tramway Company, fourteen animals developed Surra in 1888 out of a total stud of 739 horses, and forty-seven in 1889.

But on the other hand in 1890, only one case occurred in the same stud; too much importance however must not be laid on such examples, for such cases can be readily explicable on the supposition that the disease has a local origin.

(ii.) *In some instances cases have followed one another, so as to favour the idea that the disease has been communicated by one horse to another.*—Is the prevalence of Surra in direct proportion to the degree of intercourse between the healthy and the sick animals?

We have abundant evidence to prove to the contrary. Evans ‡ states "that seventy-seven horses of the 3rd Panjab Cavalry becoming affected with Surra at Jutta, from which they all died at Edwardesabad, did not communicate the disease to others." Gunn § found at Kohat, "that the grass-cutters' ponies stood in the same lines as the other animals, but no mule belonging to the mountain battery, nor horse from the Panjab Cavalry became ill of the disease." Again in the Bombay Tramway outbreaks, with one exception, when several animals became affected, which had been located on the north-side of the stables; the animals attacked with Surra were not found to be in close proximity to each other, but to have been dotted about over the large area which the stables cover; and in most instances were far apart, and surrounded by healthy animals, which remained free from the disease.

(iii.) *Animals brought from localities where the disease is unknown are attacked on being taken to districts where the disease is endemic.*—On several occasions it has happened, that Australian horses belonging to the Tramway Company, under one year in this country, have been the first animals during the year to be attacked with Surra, so that contagion is out of the question in those cases.

(iv.) *That animals are occasionally found suffering from this disease in districts not known previously to be infected localities.*—Although cases may occasionally be found in a part of the country where it is not endemic, and where the conditions are not favourable for its development, it will generally be found on inquiry, that such cases can be traced to the fact, that the animals affected have been recently imported from places where it is endemic (see Case No. X); and also one may mention the outbreak in 1885 which occurred amongst transport animals, which had been collected from low-lying districts below the Ghâts, &c., and brought to Poona where the disease is not endemic; but when these cases succumbed, no fresh cases occurred in the station.

(v.) *There are no records to be found as to Surra having been imported by suffering animals into localities before exempt from it, and the disease from that time forward becoming endemic.*

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* Evans, page 63.

† Steele, page 37, para. 17.

‡ Evans, page 62-63.

§ Gunn, *loc cit.*

From the foregoing evidence it would appear that Surra is not communicable by the sick to healthy animals, except under certain conditions hereafter mentioned. From our present knowledge we should say, that the 'materies morbi' of the disease appears to be governed by the following laws :—

(*a*). Surra in certain parts of India and Burma is an endemic disease, or its epidemics are circumscribed.

(*b*). It is most prevalent between the months of September and December inclusive, commencing soon after the beginning of the rains.

(*c*). It is independent of overcrowding, and attacks all horses, Australian and Asiatics, but a greater percentage of the former.

(*d*). It is generated independently of a previous case.

(*e*). The contagium of Surra is neither conveyed by the air, nor by the sick to the healthy, but gains an entrance into the system, either by the mouth with the food and water, or is introduced by some form of superficial inoculation (be it by direct contact of blood, or secretion containing blood on an abraded surface, or by the bite of certain flies) ; and it is necessary for one or other of these two forms of inoculation to take place, in order that the disease be successfully transmitted. So that this disease is not contagious in the ordinary sense of the term, but is the result of local causes endemic in the different parts of the East, where the disease presents itself.

(*f*). The blood of an affected animal when introduced subcutaneously into a healthy one, possesses the power of reproducing the same disease, whether the hæmatozoon at the time of its withdrawal from the circulation of the affected animal be capable of demonstration or not by microscopical means. As regards the quantity required, it has been found that a fraction of a minim of the soiled blood, containing the hæmatozoon, taken from one horse and placed betwen the edges of a minute wound in the cuticle of a sound, healthy horse, was sufficient to reproduce the disease in the animal so treated within 7 days.

(*g*).—*The latent period of Surra*, or in other words, the time which elapses between the introduction of the *materies morbi* into the system, and the first appearance of the hæmatozoon in the blood of the general circulation, will be found to vary considerably according to certain circumstances. The chief conditions which influence it will be found under the following headings :—

I.—*The species of animal inoculated.*

II.—*The means used for inoculating the animal.*

III.—*The kind of fluid used for inoculation, viz :—*

(*a*).—Blood.

(*b*).—Serum.

(*e*).—Fluid taken from the Tunica Vaginalis Testis.

(*d*).— Do. Pericardial Sac.

(*e*).—Cerebro-spinal fluid.

IV.—*Whether the fluid used for inoculation was drawn ante or post mortem from the animal affected with Surra :—*

(*a*) *Ante mortem.*

(i) If during a paroxysm.
The number of hæmatozoa present at the time of inoculation.

(ii) If during an intermission or an apyrexial period, the presence or absence of anything on microscopical examination.

(*b*) *Post mortem.*

- (i) The number of hours that were allowed to elapse between death and the inoculation.
- (ii) The number of hæmatozoa in the blood just previous to death.

V.—*The Quantity of the fluid introduced into the system of the animal, either by—*

- (i) Direct injection into the general circulation.
- (ii) Gastric ingestion.
- (iii) By subcutaneous inoculation.
- (iv) By smearing on an abraded surface, or slight cutaneous incision from which no blood escaped.

(*I*) *The latent period in naturally contracted cases.*

A most difficult point to clear up, and one which up to the present has not been recorded, is the latent period of Surra in cases in which it is contracted naturally. The difficulty can more readily be understood, when it is recognized that the contagium is in all probability taken into the system of the animal, together with its forage or water, or perhaps with both; and that at a subsequent period, when the symptoms of disease become evident, the animal may be in a different part of the country altogether.

On perusal of Case LXV it will be evident to every one, that the four horses, A, B, C, and D, were in normal health and condition up to the time of their leaving Malabar Hill on March 16th, 1892. On this date A, B, and C were taken to Pali Hill, Bandora, and were watered from the wells, which at that season of the year are getting low, and the water dirty and somewhat concentrated. The animal D was on the same date stabled in the Fort, Bombay. The horses A, B and C drank the above well water from March 17th to April 14th, from which date, as the water had been pronounced very bad, it was discontinued and Vehar pipe water substituted. A, became unwell on the 15th of April (appeared feverish); on the 26th she was quite well again, and with B and C was taken on a shikár expedition, during which they were watered at rivers and wells together with five Sowár's horses. During this period all these animals were exposed to exactly the same influences with regard to season, climate, feeding and watering, as A, B and C were. They all worked hard in the sun between April 26th and May 17th, and during the whole of this period A was unwell, stumbling in action, feverish and losing condition; she was therefore not worked so hard as the others. On May 17th, they were returned to Pali Hill; A was then feverish and unwell; she was driven a short distance, and on her return appeared to be very bad, and refused food. On the 23rd of May, B (No. LXV) refused her food, and an eruption broke out over the whole body accompanied by fever, which continued until the 30th of the month; between the 4th and 8th of June A and B showed symptoms of 'Surra' and on the 9th the Surra hæmatozoon was detected in B's blood, but that of A was free. A's condition continued to get worse, and on June 14th she was shot. None of the other horses, C, D, or the Sowárs' animals, have shown any symptoms of illness. This points to the fact that the disease was contracted from the water of the Pali Hill wells between March 17th and April 14th, a period of twenty-eight days. There can be no doubt that A's illness commenced on April 15th, after an exposure of twenty-eight days, and that the first symptom noticed in B's case was the eruption of the skin, which occurred on the 23rd of May, so that B was exposed to the influence of the water for exactly the same period, viz., twenty-eight days, as in the case of A; but no symptom occurred for a further period of thirty-nine days, so that the latent period in A was some time within a period of twenty-nine days, whilst that of B was within a period of sixty-seven days, and further we learn that all animals, although exposed to the same dangerous conditions, are not equally susceptible to the contagium; as in the case of animal C and the Sowars' horses.

Thus horse A drank polluted water between the 17th March and April 14th, 1892. First symptom April 15th 1892. Latent period some time within a period of twenty-nine days.

In Horses.

Horse B. (No. LXV) drank polluted water between the 17th March and April 14th, 1892. First symptom, urticarial eruption, May 23rd, 1892. Latent period some time within a period sixty-seven days, but certainly not less than thirty-nine.

(*II*) *The latent period, when the contagium is given by the mouth* :—

(*a*) Gastric ingestion of a considerable amount of soiled blood.

(*b*) In small doses in water, following more closely the way in which animals are supposed to contract the disease naturally.

(*a*) *By gastric ingestion of a considerable amount of soiled blood.* On the evening of September 29th, 1880, Evans* experimented upon a fairly healthy, aged, mare, by administering twenty ounces of blood drawn from the Jugular Vein of an animal suffering from Surra. On the morning of October 6th, the blood when examined microscopically was swarming with very active parasites. In this case an observation was made on the 4th of October, to the effect that the temperature was 99·8°F. (37·6°C.) ; blood examined, but no parasite found ; but there is no note on the following day, the 5th, regarding the condition of the blood, although the temperature is recorded as having been 102·2°F (39°C.). Consequently I am inclined to believe, that the hæmatozoon would have been found on the 5th if it had been looked for, taking into account the rise of temperature and the fact that the hæmatozoa were swarming in the blood on the morning of the 6th. In this case then, the latent period may be said to have been only 5·5, or at the most 6·5 days.

On the morning of the 30th of September, to a second mare Evans gave twenty ounces of blood, drawn from the Jugular Vein of the same horse, as that from which the blood was taken for the preceding experiment. On the morning of the 6th of October, with a temperature of 103°F (39·4°C.) the blood presented many parasites, but not swarming as in the last case. The latent period extended from the morning of the 30th September to that of the 6th October, or six days.

(*b*) *By giving small repeated quantities of soiled blood in water.*—As no previous researches have been conducted with small quantities of soiled blood in water, it was decided to endeavour to produce the disease, in a somewhat similar manner to that in which it is naturally contracted. With this end in view, a strong healthy Australian gelding was obtained, 16 years old and in good condition, to which small quantities of blood mixed with a large bulk of water were to be given at short intervals. Accordingly on the 4th May 1891, four minims (0·25c.c.) of blood, (swarming with the Surra hæmatozoon), mixed with one gallon of fresh water, were given to the animal to drink. Up to the 9th no change had taken place in the animal's condition, and on this date eight minims (0·53c.c.) of blood containing numerous hæmatozoa were given in the same way. On the 10th and 11th the animal showed no change. On the latter date six minims (0·4c.c.) of blood containing the Surra hæmatozoon were given in a quart of water. On the 12th a few small petechiæ were noticed on the membranæ nictitantes. Up to the 24th with the exception of a slight indisposition on the 18th, which rapidly passed off, no symptoms of disease were noticed. On the 24th the animal received in water eight minims (0·53c.c.) of blood containing very numerous hæmatozoa ; no change of any importance was noticed up to the 6th June, and on that date the animal received in water eight minims of blood containing numerous hæmatozoa. There was no change on the 14th of June, when thirty minims (2·0 c.c.) of blood containing very numerous hæmatozoa were given in three quarts of water. On the 16th no change having taken place, ten minims (0·66 c.c.) of blood swarming with hæmatozoa were given. On the 17th twenty-five minims (1·6 c.c.), taken from Horse

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* Evans—Appendix F.

No. XXIII suffering from Surra, but from which the hæmatozoon was absent, were given in a gallon of water. From this date to the 28th June no change was noticed. On the latter date two hundred minims (13·3 c.c.) of blood containing very numerous hæmatozoa were administered in a bucket-full of water. From this date (June 28th) up to September 1st, absolutely no symptom of disease was noticed; but from the 1st until the 6th of September there was a very slight disturbance of temperature, which however remained normal. On the morning of the 11th September the temperature had risen to 39·4°C. and numerous hæmatozoa were observed in the blood.

Thus it will be seen, that from the first exhibition to the animal of the soiled Surra blood on May 4th, 1891, until the last on the 28th June, a period of fifty-five days had elapsed; and from the exhibition of the last two hundred minims, until the first appearance of the hæmatozoon in the blood, seventy-five days, or from first to last one hundred and thirty days.

(*III*) *The latent period when the fluid used for inoculation is drawn ante or post mortem from the animal affected with Surra.*

Ante Mortem.

I.—Blood taken during a paroxysm.

(*a*) *By gastric ingestion.*

Horse No. XX—200 minims containing very numerous hæmatozoa. Period of incubation from the date of the last administration *seventy-five* days.

(*b*) *By direct injection into the general circulation.*

Horse No. XV.—0·8c.c. containing numerous hæmatozoa, *six* days.
,, ,, XIV.—0·7c.c. ,, ,, ,, *five* ,,

(*c*) *By subcutaneous injection.*

Horse No. V.—3·0c.c. containing very numerous hæmatozoa, *four* days.
,, ,, VIII.—1.0c.c. ,, ,, ,, *five* ,,
,, ,, XXII.—1·0c.c. ,, ,, ,, *four* ,,
,, ,, IV.—1·0c.c. ,, few hæmatozoa, *eight* days.
,, ,, XXX.—1·0c.c. ,, ,, ,, *seven* ,,
,, ,, XXIX.—0·8c.c. ,, ,, ,, *seven* ,,
,, ,, LIX.—0·5c.c. ,, numerous ,, *five* ,,
,, ,, LXIV.—0·5c.c. ,, few ,, *seven* ,,
,, ,, XII.—0·13c.c. (2 minims) numerous hæmatozoa, *six* days.
,, ,, LIV.—0·1c.c. containing swarms of ,, *four* ,,
,, ,, LV.—0·1c.c. ,, ,, ,, *seven* days.
,, ,, XXIV a fraction of one minim, very numerous hæmatozoa, *seven* days.

II.—Blood taken during an Intermission.

(*a*) *By subcutaneous injection.*

Horse No. XIII.—1·0c.c. hæmatozoon absent from the blood, *eight* days.
,, ,, XXI.—1·0c.c. ,, ,, ,, *eight* ,,
,, ,, XLVIII.—0·5c.c. ,, ,, ,, *ten* ,,

Post Mortem.

I.—Blood removed from the heart or great vessels.

(*a*) *By subcutaneous injection.*

Horse No. XXVII inoculated with 2·0c.c. blood taken *sixteen hours* post mortem, from which the hæmatozoon was absent, but very numerous ante mortem. Latent period *eleven* days.

,, ,, XI inoculated with 1·0c.c. blood taken *ten and half hours* post mortem from which the hæmatzoon was absent, but very numerous ante mortem. Latent period *eleven* days.

,, ,, XVIII inoculated with 2·0c.c. blood taken *ten hours* post mortem, from which the hæmatozoon was absent, but numerous ante mortem. Latent period *thirteen* days.

,, ,, XIX inoculated with 2·0c.c. blood taken *ten hours* post mortem, from which the hæmatozoon was absent, but numerous ante mortem. Latent period *nine* days.

,, ,, XXXII inoculated with 0·3c.c. blood taken *eight and half hours* post mortem, from which the hæmatozoon was absent, but very numerous ante mortem. Latent period *nine* days.

,, ,, XLVI inoculated with 1·0c.c. blood taken *eight and half hours* post mortem, from which the hæmatozoon was absent, but very numerous ante mortem. Latent period *eight* days.

,, ,, XXIII inoculated with 1·0c.c. blood taken *five and half hours* post mortem, from which the hæmatozoon was absent, but swarming ante mortem. Latent period *eight* days.

,, ,, LVIII inoculated with 1·0c.c. blood taken *five hours* post mortem, from which the hæmatozoon was absent, but swarming ante mortem. Latent period *nine* days.

II.—Blood serum from the large vessels.

(*a*) *By subcutaneous injection.*

Horse No. VII inoculated with 1·0c.c. serum taken *two hours* post mortem, the hæmatozoon was absent, but was numerous in the blood ante mortem. Latent period *eight* days.

Ante Mortem.

Tunica Vaginalis Testis fluid, and blood—

With material passed through the Goat, from the Horse to the Horse again.

Horse No. XXXIII inoculated with 1·0c.c. of fluid from the tunica vaginalis testis of goat, in which the hæmatozoa were numerous. Latent period *five days.*

Horse No. XXXIV inoculated with 1·0c.c. of blood from No. XXXIII, ante mortem containing numerous hæmatozoa. Latent period *thirteen days.*

Post Mortem.

I.—Blood removed from the heart or great vessels—

Horse No. XXXVIII inoculated with 1·0c.c. of blood taken *nine and a half hours* post mortem, from which the hæmatozoon was absent, but very numerous ante mortem. Latent period *nine days.*

Horse No. XLI inoculated with 1·0c.c. of blood taken *nine and a half hours* post mortem from case No. XL, from which the hæmatozoon was absent, but very numerous ante mortem. Latent period *seven days.*

„ „ XL inoculated with 0·6c.c. of blood taken *one hour and a quarter* post mortem from case No. XXXIV, from which the hæmatozoon was absent, but very numerous ante mortem. Latent period *six days.*

„ „ XXXI inoculated with 0·3c.c. of blood taken *eight hours* post mortem from case No. XXXIII, from which the hæmatozoon was absent, but swarming ante mortem. Latent period *nine days.*

II.—Blood serum removed from the large vessels.—

Horse No. L inoculated with 2·0c.c. of blood serum taken forty-five minutes post mortem from case No. XXXVIII, from which the hæmatozoon was absent, but swarming ante mortem. Latent period *nine days.*

INOCULATION OF OTHER ANIMALS THAN HORSES.

Ante Mortem.

I.—Blood taken during a paroxysm from horses—

(*a*) *By subcutaneous injection.*

BULL 1·7c.c. containing very numerous hæmatozoa, latent period *seven* days.

SHEEP 0·8c.c. containing a few hæmatozoa, and with 1·0c.c. containing a few hæmatozoa fourteen days later, no organism found in the blood, but they were found on the fifty-ninth day in the fluid of the tunica vaginalis testis.

GOAT 0·5c.c. containing swarms of hæmatozoa, the latent period was *seven* days.

RABBITS 0·3c.c. containing very numerous hæmatozoa, latent period *five* days.
0·3c.c. „ „ *nine* days.

GUINEA-PIGS 1·0c.c. containing very numerous hæmatozoa, latent period *twelve* days.
„ 1·0c.c. „ „ *nine* days.
„ 0·5c.c. „ „ this was a pregnant doe, and the latent period was *seven* days, showing that pregnancy predisposes.

RATS (*Mus decumanus*) 0·2c.c. containing very numerous hæmatozoa. Latent period *one* day.
„ 0·1c.c. containing a few hæmatozoa. Latent period *two* days.
„ „ „ „

RATS (*Nesokia providens*) 0·2c.c. containing numerous hæmatozoa. Latent period *two* days.
„ „ „ „ *five* days.
„ „ „ „ „

Post Mortem.

I.—Blood and other fluids removed from the body—

(*a*) *By subcutaneous inoculation.*

Goat No. III inoculated with 1·0c.c. blood taken *five and a quarter hours* post mortem, from which the hæmatozoon was absent, but swarming ante mortem. Latent period *six days.*

Guinea-pig inoculated with 0·5c.c. cerebro-spinal fluid *two hours* post mortem, hæmatozoa absent, but very numerous in the blood ante mortem. Latent period *eleven days.*

Guinea-pig inoculated with 1·0c.c., pericardial fluid *thirteen hours* post mortem, hæmatozoa absent, but swarming in the blood ante mortem. Latent period *ten days.*

Guinea-pig ,, ,, ,, ,, Latent period *ten days.*

TABLE XI.

Showing the latent period of Surra ascertained experimentally in different animals.

No.	Animal inoculated.	Fluid used.	Quantity of Fluid used.	Fluid from what Animal taken.	How inoculated.	Whether Fluid taken Ante or Post Mortem.	No. of hours taken Post Mortem.	No. of Hæmatozoa in the Fluid Ante Mortem.	No. of Hæmatozoa in the Fluid Post Mortem.	Date of Inoculation.	Date of the first appearance of the Hæmatozoa in the Blood.	Length of the Latent Period.
										D. m. y.	D. m. y.	Days.
LXV *a*	Horse	Well water	...	....	By mouth	...	...	...	...	17 3 92 14 4 92	?	?
LXV *b*	,,	,,	...	....	,,	...	...	...	...	17 3 92 14 4 92	23 5 92	67
XX	,,	Blood	291 mins.	Horse No. XXIII	By mouth in water.	A M	...	V N	...	28 6 91	11 9 91	75
XIV	,,	,,	0·7c.c.	,, XI	Direct, I. J. V.	A M	...	N	...	30 1 91	4 2 91	5
XV	,,	,,	0·8c.c.	,, XI	,,	A M	...	N	...	30 I 91	5 2 91	6
V	,,	,,	3·0c.c.	,, IV	Subcut : inoc.	A M	...	V N	...	18 11 90	22 11 90	4
VIII	,,	,,	1 0c.c.	,, VII	,,	A M	...	V N	...	19 12 90	24 12 90	5
VI	,,	,,	1·0c.c.	,, IV	,,	A M	...	V N	...	22 11 90	27 11 90	5
XXII	,,	,,	1·0c.c.	,, XXI	,,	A M	...	V N	...	29 5 91	2 6 91	4
IV	,,	,,	1·0c.c.	,, III	,,	A M	...	F	...	8 11 90	16 11 90	8
XXX	,,	,,	1·0c.c.	,, XXIII	,,	A M	...	F	...	7 7 91	14 7 91	7
XIII	,,	,,	1·0c.c.	,, XIX	,,	A M	...	A	...	29 4 92	7 5 92	8
XXI	,,	,,	1·0c.c.	,, XIX	,,	A M	...	A	...	29 4 91	7 5 91	8
XXIX	,,	,,	0·8c.c.	,, XXIII	,,	A M	...	F	...	7 7 91	14 7 91	7
LXIV	,,	,,	0·5c.c.	,, LXV	,,	A M	...	F	...	14 6 92	21 6 92	7
XLVIII	,,	,,	0·5c.c.	,, L	,,	A M	...	A	...	12 11 91	22 11 91	10
XII	,,	,,	Minims ii	,, XIX	,,	A M	...	N	...	5 4 92	11 4 92	6
LIX	,,	,,	0·5c.c.	,, LVIII	,,	A M	...	N	...	3 5 92	8 5 92	5
LIV	,,	,,	0·1c.c.	,, LVI	,,	A M	...	S	...	26 12 91	30 12 91	4
LV	,,	,,	0·1c.c.	,, LIV	,,	A M	..	S	...	5 2 92	12 2 92	6
XXIV	,,	,,	A fraction of a minim	,, XXII	,,	A M	...	V N	...	15 6 91	22 6 91	7
XVIII	,,	,,	2·0c.c.	,, XV	,,	P M	10	N	A	12 3 91	25 3 91	13
XIX	,,	,,	2·0c.c.	,, XV	,,	P M	10	N	A	12 3 91	21 3 91	9
XXVII	,,	,,	2·0c.c.	,, XXX	,,	P M	16	V N	A	16 7 91	27 7 91	11
LVIII	,,	,,	1·0c.c.	,, XLVII	,,	P M	5	S	A	29 3 91	7 4 91	9
XXIII	,,	,,	1·0c.c.	,, XXI	,,	P M	5·5	S	A	4 6 91	12 6 91	8
XLVI	,,	,,	1·0c.c.	,, XLVIII	,,	P M	8·5	N	A	23 11 91	1 12 91	8
XI	,,	,,	1·0c.c.	,, VIII	,,	P M	10·5	V N	A	11 1 91	22 1 91	11
XXXII	,,	,,	0·3c.c.	,, XXIII	,,	P M	8	V N	A	11 7 91	20 7 91	9
VII	,,	Serum	1·0c.c.	,, III	,,	P M	2	N	A	10 12 90	18 12 90	8
XXXIII	,,	T. Vag. Testis.	1·0c.c.	Goat No. III	,,	A M	...	N	...	25 7 91	30 7 91	5
XXXIV	,,	Blood	1·0c.c.	Horse No. XXXI	,,	A M	...	N	...	2 8 91	14 8 91	12
XXXVIII	,,	,,	1·0c.c.	,, XL	,,	P M	9·5	V N	A	26 8 91	4 9 91	9
XLI	,,	,,	1·0c.c.	,, XL	,,	P M	9·5	V N	A	26 8 91	2 9 91	7
XL	,,	,,	0·6c.c.	,, XXXIV	,,	P M	1·25	V N	A	15 8 91	21 8 91	6
XXXI	,,	,,	0·3c.c.	,, XXXIII	,,	P M	8	S	A	11 7 91	20 7 91	9
L	,,	,,	2·0c.c.	,, XXXVIII	,,	P M	0·75	S	A	15 10 91	24 10 91	9
I	Donkey	,,	2·0c.c.	,, LXXXIV	,,	P M	Immediately.	N	...	9 2 93	13 2 93	4
I	Bull	,,	1·75c.c.	,, XIX	,,	A M	...	N	...	24 3 91	29 3 91	5
(i)	Guinea-pig	,,	0·2c.c.	Bull No. I	,,	A M	...	A	...	17 6 91	27 6 91	10
(ii)	,,	,,	0·2c.c.	,,	,,	A M	...	A	...	17 6 91	5 7 91	18
(iii)	,,	,,	0·2c.c.	,,	,,	A M	...	A	...	3 9 91	12 9 91	9
(iv)	,,	,,	0·2c.c.	,,	,,	A M	...	A	...	3 9 91	12 9 91	9
(i)	,,	,,	0·7c.c.	Sheep No. I	,,	A M	...	A	...	24 1 91	3 2 91	10
(ii)	,,	,,	0·7c.c.	,,	,,	A M	...	A	...	24 1 91	7 2 91	14
I	Goat	,,	0·5c.c.	Horse No. II	,,	A M	...	S	...	4 11 90	10 11 90	6
III	,,	,,	1·0c.c.	,, XXI	,,	P M	5 25	S	A	4 6 91	10 6 91	6
I	Rabbit	,,	0·3c.c.	,, II	,,	A M	...	V N	...	2 11 90	7 11 90	5
II	,,	,,	0·3c.c.	,, ...	,,	A M	...	V N	...	2 11 90	11 11 90	9
I	Guinea-pig	,,	1·0c.c.	,, ...	,,	A M	...	V N	...	2 11 90	13 11 90	11
II	,,	,,	1·0c.c.	,, ...	,,	A M	...	V N	...	2 11 90	11 11 90	9
III	,,	,,	0·5c.c.	,, IV	,,	A M	...	V N	...	24 11 90	1 12 90	7
I	Rat (M. dec.)	,,	0·2c.c.	,, VII	,,	A M	...	V N	...	19 12 90	20 12 90	1
II	,,	,,	0·1c.c.	,, ...	,,	A M	...	F	...	23 12 90	25 12 90	2
III	,,	,,	0·1c.c.	,, ...	,,	A M	...	F	...	23 12 90	25 12 90	2
1	Rat (Nes. pro.)	,,	0·2c.c.	,, ...	,,	A M	...	N	...	26 12 90	28 12 90	2
II	,,	,,	0·2c.c.	,, VI	,,	A M	...	N	...	7 1 91	12 1 91	5
III	,,	,,	0·2c.c.	,, VI	,,	A M	...	N	...	7 1 91	12 1 91	5
I	Guinea-pig	Pericardial	1·0c.c.	,, LVI	,,	P M	13·0	A	A	28 12 91	7 1 92	10
II	,,	,,	1·0c.c.	,, LVI	,,	P M	13·0	A	A	28 12 91	7 1 92	10
I	Guinea-pig	Cerebro-Spinal Fluid.	0·5c.c.	,, XXXIV	,,	P M	2·0	A	A	15 8 91	26 8 91	11

(h.)—Proportion of animals liable to be attacked on exposure to the 'materies morbi' of 'Surra'.—We have no statistics bearing on the question, with the exception of those published by Rimington. He states, that out of a total stud of 739 horses in 1889, forty-seven were attacked and succumbed, or were destroyed on account of Surra.

(i.)—Immunity from subsequent attacks.—Death follows the first attack in all the above mentioned animals, with the exception of bovine species, and our experiments tend to prove that one attack may grant immunity to these animals, at all events for a considerable period.

SECTION VII.

SYMPTOMS OF SURRA.

Clinical Description.

Before describing the symptoms of Surra, it will be neccessary first to divide cases of the disease under two different heads, viz. :—

A.—Those which have contracted the disease in the natural course of events.

B.—Those which have acquired the disease by inoculation.

A.—Symptoms of the disease as observed when contracted naturally.—The invasion of this disease is usually marked by symptoms of a trivial character, the skin feels hot, and there may be more or less fever; there is also slight loss of appetite, and the animal appears dull and stumbles during action ; thus early a symptom sometimes appears, which may be the first intimation received of the animal's indisposition, and which as a guide to diagnosis is of great importance ; it is the presence of a general or localized urticarial eruption. If the blood be examined microscopically it may be found to present a normal appearance, but in the majority of cases a few small rapidly moving organisms will be observed, giving to the blood, as it passes amongst the corpuscles a peculiar vibrating movement, which if once observed will not readily be forgotten. If the hæmatozoon has not been discovered in the blood for some days, the before-mentioned may be the only symptoms noticeable, and as a rule when treated with febrifuges, the horse quickly improves in health and the appetite returns. This condition does not last for more than a few days, when the animal is again observed to present a dull and dejected appearance, and on examination well marked symptoms are found ; the skin is hot, the temperature more or less elevated, 38·7°C. to 40°C., the pulse full and frequent, 56 to 64 beats per minute, the visible mucous membranes may appear clean, but the conjunctival membranes, especially those covering the membrana nictatans, are usually the seat of dark red patches of ecchymosis, varying in size in different animals. There is more or less thirst, and slight loss of appetite, the animal eating its corn and green grass, whilst leaving all or a portion of the dried grass with which it has been supplied. At the same time there are slight catarrhal symptoms present, including lachrymation, and a little mucous discharge from the nostrils. Occasionally at this period of the disease the submaxillary glands may be found enlarged, and perhaps somewhat tender on manipulation. One symptom is markedly absent, namely, the presence of rigors, or the objective signs of chilliness. In addition it will be noted, that there is some swelling and œdema of the extremities, generally between the fetlock and the hock, which pits, but is not painful on pressure, and in the case of horses there may be present also at this stage of the disease, some swelling of the sheath. When the fever and concomitant symptoms have declared themselves during a short period, one thing becomes especially noticeable in every animal attacked, namely, the rapidity with which it loses flesh. If the blood has been examined microscopically during the second period of fever, at first a few hæmatozoa will have been observed in it, which day by day increase in number and reach a maximum, where they remain for a varying period, or at once suddenly or gradually disappear during the period of apyrexia. After the fever and the accompanying symptoms have for the second time been present for some days, the period varying from one to six, the animal is found to have lost the dull dejected appearance, and to look bright; the elevated temperature has fallen, and in some cases has attained normal or even sub-normal limits. The visible mucous membranes are clean, and the conjunctival petechiæ begin to fade; the pulse, however, will be found to be weak and thready in character, but the appetite excellent, and in fact if it were not for the loss of flesh and slight œdema of the extremities, there would be little to show that the animal was ailing. But unfortunately this condition does not continue for any length of time, for again the temperature is elevated; in the course of a few hours the thermometer registers a still higher degree, the animal is dull and dejected, and by the following day the visible mucous membranes present a yellow tinge; large ecchymoses dark in colour appear on the conjunctival membranes; the action of the heart is irritable, the pulse full and quick, or at times intermittent, and regurgitation may be observed in the jugulars; the breathing is quickened, and the individual respirations shallow; on watching an animal in this condition, it may be noticed that it takes seven to eight very short inspirations, and these are followed by a much more prolonged and sonorous one; at the same time the breathing is more abdominal, than thoracic in character. On examination of the extremities, it will be found that the swelling and œdema have increased considerably, and that on the under-surface of the abdomen, where it was previously confined to the sheath, it has now commenced to spread forward along the subcutaneous tissue between the skin and the muscles. During the whole of this time the appetite will have varied little, and the evacuations will be only slightly, if at all, altered in character. In the blood a repetition of the previous events takes place, the hæmatozoa make their appearance, and run up to a maximum, and again suddenly or gradually disappear according to the length of the fever period. These periods alternating with and without fever may go on for a considerable time; the progress of the disease is variable, and greatly depends upon the condition of the animal attacked, the weak ones succumbing very rapidly; but each bout of the fever brings with it as a rule an increase in the severity of the symptoms. There is augmented yellowness of the membranes, fresh crops of petechiæ on the conjunctival, a collection of gelatinous material at the inner canthi, which at times becomes red in colour from an admixture of blood, and which on microscopical examination is found to contain a varying number of the Surra hæmatozoa; increased swelling and œdema of the extremities and abdomen, which now extends between the fore limbs and up the chest. During this time the wasting has been steadily progressive, especially the muscles of the back and those surrounding the hip joint and the glutei.

Towards the termination of the disease, it will be noticed that an animal is disinclined to move, and when made to do so, there will be manifest loss of power over the hind quarters, somewhat similating a slight partial paralysis, and the hind quarters of the animal reel from side to side. In connection with this it may be noted, that there is frequently present paralysis of the sphincter ani, and a dilated condition of the anus. These symptoms taken together, point to some interference with the normal functions of the spinal cord in the lower dorsal and lumbar regions, and is probably due to pressure caused by an exudation within the spinal membranes. In many cases shortly before death the heart's action becomes exceedingly violent, shaking the whole frame at each beat, so that the sound can be heard at some distance from the animal. In some of these cases the animal may suddenly drop dead. In others, the emaciation and weakness become so pronounced that the animal falls to the ground, and after a short bout of struggling, succumbs to the disease. In other cases, again, the animal falls to the ground and appears to be suffering from acute pain, struggles violently, sweats bedew the body, and the respirations are very hurried. The struggles soon exhaust the patient's strength, and for a time it lies quiet; soon however the struggles commence again, and this continues until death occurs.

B.—Those which have acquired the disease by inoculation.—Twenty-four hours after the subcutaneous injection of a small quantity of Surra blood, in the great majority of cases, a small, circumscribed, and somewhat raised, swelling is noticed at the seat of inoculation; after forty-eight hours the tumour has increased in size, and is accompanied by some œdema; it presents a certain amount of tension of the parts involved, and is generally tender on manipulation. These conditions continue to increase, until by the fourth day, the tumour may measure three or four inches in one direction, by two or three in the other, and raised to the extent of an inch or inch and a half above the surrounding tissues, or in some cases present an almost circular form throughout. It will be also found that if the tumour be firmly grasped, it is not fixed, but can be lifted up from the subcutaneous tissue. According to the nature and amount of the inoculated blood, so will these symptoms rapidly present themselves, and either attain a maximum or be retarded, until, varying from the fourth to the thirteenth day, the tumour at the seat of inoculation will be found to have lost a certain amount of its tension and tenderness. From this date the swelling and œdema will gradully begin to grow less, until finally after a period of ten to fourteen days, the only sign left of the former swelling will be a slight thickening of the skin over the point of injection. But at the moment when the tension and tenderness of the parts at the seat of inoculation become suddenly decreased, a symptom, of the utmost importance clinically, takes place, viz., at that moment, the organism of Surra enters the blood of the general circulation.

The temperature on the day of inoculation, and in fact for several days afterwards, may remain normal in character, there being only a few points difference between the morning and evening observations. In other cases there may be a slight rise from the first evening, and a gradual progressive rise until the swelling at the seat of inoculation shows signs of reduction in size, when the temperature generally takes a decided rise again, and may attain 40°C. or 41°C. This elevation will last a varying period of from two to six days, and on the day following its onset, the ordinary symptoms of fever will be noticed; and in addition there will be petechiæ on the conjunctival membranes, lachrymation, a slight mucous discharge from the nose, and in severe cases some œdema of the lower portion of the extremities, and perhaps of the sheath in horses. At the termination of the period of fever, the temperature will be found to have fallen to normal, or nearly so; the animal will present a brighter aspect, and there is every appearance of its return to health; but in a few days the animal again appears dull and semi-somnolent; the temperature becomes elevated, and a relapse takes place, and a repetition of all the symptoms in the primary paroxysm including the re-appearance of the hæmatozoon, is observed.

C.—ANALYSIS OF PRINCIPAL SYMPTOMS.

a.—Morbid Phenomena referable to the skin.

(1). *Eruption.*—In the majority of cases, no eruption of any kind occurs during the whole duration of the disease. Steele, however, noted in mules an eruption of spots on the skin of the muzzle, resembling in its essential nature those he had observed on the mouth and nostrils. In the course of this investigation, we have observed a number of cases of urticaria, appearing somewhat suddenly, and as a rule disappearing after a few hours. The eruption has been either general or localized in character, and could be conveniently placed under several of the different classifications:—viz., the affection which passes away in a few hours, *Urticaria ephemera*, or within a few days (*U. evanida*), or the form which is either preceded or accompanied by fever, (*U. febrilis*), and lastly the (*U. nodosa sue tuberosa*) which is characterized by the appearance of nodosities of some size. The following is a short account of the cases observed, twelve in number, placed under the different groupings.

Naturally contracted.

Horse No. III.—The eruption appeared on the morning of the 18th day of the disease, as far as could be ascertained, and invaded the skin of the head, neck, and body. Temp. 37·9°C. A.M., rising to 40·4°C. in the evening. The hæmatozoon was absent from the blood during the persistence, but on the morrow, when the rash had entirely disappeared, it was present in small numbers.

Horse No. LXV.—An eruption broke out over the whole body, which passed away in a few days, leaving fever, which continued until the 30th May, 1892. This was the first symptom of Surra noted.

Horse No. LXXI.—The eruption appeared on the morning of the 16th day of the disease, and was well marked between the thighs, especially of the left one; there were a few patches on the neck and back. Temp. 38·5°C. A.M. rising to 40°C. in the evening. The hæmatozoa were numerous in the blood all the time the eruption lasted, although they were only few in number on the previous following days.

Horse No. LXXII.—Five patches of urticaria appeared on the left side of the neck, on the morning of the twenty-second day of the disease, and persisted for forty-eight hours; during this period the temperature was only slightly above the normal range, and the hæmatozoon was absent from the blood.

Horse No. LXXIII.—The urticarial eruption appeared on the neck and flanks on the day the disease was recognized, and on the morning of the second day the general surface of the skin looked uneven and puffed, and on the left side of the neck there were several patches, the remnants of the rash. On the fourth day some remains of it were left, and on the morning of the fifth day at 8 A.M. the eruption became general, involving the skin covering the neck, chest, ribs and flanks, and under-surface of the abdomen. The temperature was normal, and the hæmatozoon absent from the blood, the former rose nearly 2°C. on the evening of the fourth day, and the hæmatozoon appeared in small numbers.

Surra contracted by gastric ingestion of blood.

Horse No. XX.—The eruption appeared on the fore quarters, shoulders, neck, and hind quarters, on the ninth day of the disease. The temperature had only been a few points over 39°C.; for several days it was 38·7°C. during the persistence of the rash, and rose to 39·6°C. on the following day. The hæmatozoon, which had been absent for three days from the blood, now appeared in small numbers, and on the succeeding day became very numerous.

Subcutaneous Inoculation.

Horse No. VI.—On the morning of the twelfth day of the disease, an urticarial form of eruption appeared, involving the skin of the whole body. The temperature on the day before was 41°C., but on the morning of the eruption was 37·8°C. and in the evening 38°C. The hæmatozoa were numerous in the blood on the day prior to the appearance of the rash, few during its persistence, and numerous again on the day following. Temperature on the morning of the latter day was 38·3°C.

Horse No. XXII.—On the morning of the 11th day of the disease, the eruption appeared urticarial in character, scattered over the neck, shoulders and chest, also a few patches over the abdomen. Each individual patch consists of an elevation of skin, caused by the deposit of a varying quantity of a yellow-coloured jelly-like exudation in the subcutaneous tissue. For the most part these elevations are circular, others oval in form and irregular in size. Temp. in the morning 39·7°C. and in the evening 39·5°C. The hæmatozoa were numerous in the blood previous to the eruption, few whilst the rash persisted, and again numerous on the day following.

Subcutaneous Inoculation. (*Goat—Horse blood.*)

Horse No. XLI.—This animal was inoculated at noon one day, and an urticaria broke out the following morning, on both sides of the neck and on the skin covering the angles of the jaw. On the succeeding day the eruption was much more marked, and had extended over the scapular region, and the ribs on both sides. It persisted for thirty-six hours, and then commenced to fade. The temperature all the time was subnormal, and the hæmatozoon did not appear in the blood until ninety-six hours later.

Horse No. XL.—This animal was inoculated at noon one day, and sixty-eight hours later an urticaria appeared on the neck, and along either side of the spinal column; it consisted of circumscribed raised patches, oval or circular in form, which after persisting for seventy-four hours gradually commenced to fade, after the first appearance of the hæmatozoon in the blood. The temperature was subnormal until the morning upon which the hæmatozoon appeared, when it rose from 36·4°C. to 39°C.

Horse No. XXXIII.—An urticarial eruption appeared forty-eight hours after the hæmatozoon was discovered in the blood for the first time. It was especially well-marked on each side of the neck, shoulders, flanks and rump. The skin presented very numerous raised patches, varying in size from 1″ to 3″ × 1·5″. These lie densely covering the skin, and are circular or oval in form; they are particularly large over the skin extending from the angle of the jaw, along the course of the trachea to the root of the neck. On the rump and flanks the patches are smaller, averaging from ½″ to ¾″. The skin round the eyes is œdematous, especially the lower lids. After persisting for twelve hours the eruption commenced to fade. The temperature was subnormal, and the hæmatozoa few, during this period.

Horse No. L.—The urticarial eruption appeared on both sides of the neck, forty-eight hours after the first appearance of hæmatozoon in the blood. The individual patches were oval in form, and raised above the surrounding skin. On manipulation the small raised patches appeared to be distended with jelly-like material. The evening previous to the appearance of the eruption, the temperature registered 41°C. and the hæmatozoa were very numerous, the former suddenly fell over 3°C. and the hæmatozoon disappeared from the blood. In this case there is no doubt as to the locality of the organism after leaving the blood: it must have collected in the skin, and have been the cause of the rash, as the hæmatozoon was found on microscopical examination of the exudation from one of the urticarial wheals.

If we further examine as to the dates on which the eruption occurred in the different cases, we find that in the *naturally contracted* ones, (Horses Nos. LXV and LXXIII,) it occurred on the first day of the disease, and was of the form known as "*urticaria evanida*"; in Horse No. LXXI it appeared on the 16th day, and was an *urticaria ephemera*, that in Horse No. III on the 18th day was an *U. ephemera* also, and in Horse No. LXXII on the 22nd day, *U. evanida*. In Horse No. XX, which acquired the disease by gastric ingestion, it appeared on the 9th day of the disease, and was an *U. ephemera*. In the horses Nos. XXII and VI, it appeared in the former on the 11th, and in the latter on the 12th day of the disease, both *U. ephemera*; and in the animals inoculated with the blood of the horses through the goat,

In No. XLI the eruption appeared in 18 hours after inoculation,—(*U. evanida.*)

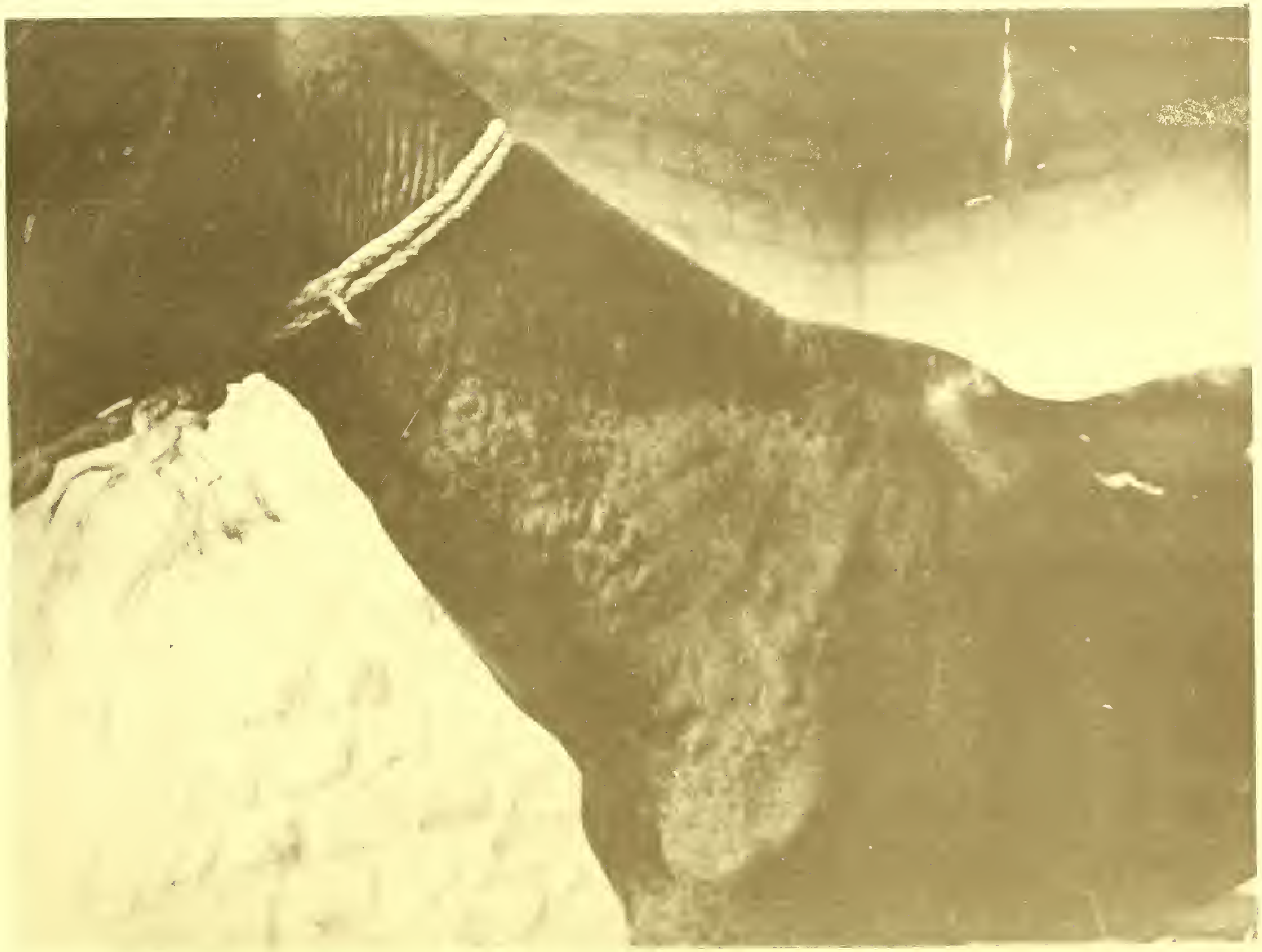
In No. XL the eruption appeared in 68 hours after inoculation,—(*U. evanida.*)

In No. XXX the eruption appeared in 48 hours after the appearance of the hæmatozoon in the blood,—(*U. ephemera.*)

In No. L the eruption appeared in 48 hours after the appearance of the hæmatozoon in the blood,—(*U. ephemera.*)

Consequently it will be seen that the eruption of urticaria may take place at any time, from 18 hours after inoculation, until the 22nd day after the appearance of the hæmatozoon in the blood.

(2) *Swelling and œdema at the seat of inoculation in experimental cases.*—When an animal has been subcutaneously inoculated with the soiled blood, or other fluids containing the 'materies morbi' of 'Surra,' considerable swelling, as a general rule, follows at the seat of such injection. If we analyse this symptom, we find that on the day following the operation, a small raised somewhat circular tumour appears, about one inch in diameter, while in some cases, especially when the blood used was obtained some hours post mortem, the measurements greatly exceed this; as in cases XXVII and XLI. On the third day the swelling has increased in dimensions, and probably measures from one and a half to two inches in diameter; it now appears tense, and is tender on manipulation. By the fourth day a still further augmentation in size, &c., has occurred, and from this date until the appearance of the hæmatozoon in the blood of the general circulation, the swelling, tension, and tenderness of the part may go on steadily increasing, or as sometimes happens, it remains stationary. At this time it will be found that if the tumour be firmly grasped by the



HORSE NO. XXXIII.

ERUPTION OF URTICARIA.

THE ANIMAL WAS INOCULATED WITH FLUID CONTAINING THE SURRA HÆMATOZOON TAKEN FROM THE TUNICA VAGINALIS TESTIS OF GOAT NO. III.

39·2°C. to 41·2°C. which it maintains for a brief period; it then falls quickly or gradually, to a normal or a subnormal minimum, either at the same time, or just previous to the first appearance of the hæmatozoon in the gluteal circulation. *Vide* Charts, Cases Nos. L, XIV, LVIII, VIII, XIX, XI.

(ii) *The Temperature from the discovery of the hæmatozoon in the blood, until death.*—The type of fever appears to vary in different outbreaks of Surra, changing according to the locality in which it occurs, and the animal affected. In Burmah, Steele described the fever in mules as being of a relapsing type, and there is no doubt, that the charts recorded in two cases of the naturally contracted disease bear out his opinion.

In the cases which have come under our observation, animals suffering from the naturally contracted and inoculated disease, present at least two varieties or types.

(i) A continued fever accompanied at tolerably frequent intervals by remissions more or less marked, and after a varying period of days, by an intermission of longer or shorter duration. These changes may be repeated several times in the course of the disease. When, however, it arrives at its last stage, the thermometer reveals a continued high temperature of a remittent type, or one characterized by morning remissions, and evening exacerbations until death.

(ii) A second and much rarer form is one which may be conveniently divided into three stages : in the first, a continuous fever, accompanied by remissions, is present for some days. This is followed by a succession of periods lasting two to five days, each individual period being made up of a gradual, or more sudden rise from the normal to 40° or 41°C., or even higher, when it attains a maximum, and after a short time is followed by an abatement of the fever, indicated by a sudden fall in temperature from 2° to 4°C., which may become normal or subnormal, and on such occasions this is succeeded by a period of apyrexia. In the third stage the fever may again take on a continued type, which is not always continuous, but remains high and oscillates freely until death.

(iii) Cases may be rapidly fatal, with the temperature remaining subnormal during the whole course of the disease. *Vide* cases XXXII (35·4°C. to 38°), XXX (35·7° to 38·8°C. just before death), XLI (35° to 37·6°C.), XXVII (normal and subnormal, never over 38·7°C.).

In some instances there may be a sudden rise in temperature just before death, but in the majority of cases there is a fall. In thirty cases under our observation, death was followed in eighteen by a fall in the temperature varying between 0·5° to 3°C., in ten by a rise varying between 0·5° to 4°C., and in two, neither rise nor fall took place.

Vide cases XVIII, XXX for falls of 3°C., and cases XXIX, XX, and XXXIV, for rises of 4°, 2·5°, and 2·8°C. respectively.

4. *Moisture.*—During the whole course of the disease, until just before death, when as a rule profuse sweating occurs, this symptom is entirely absent.

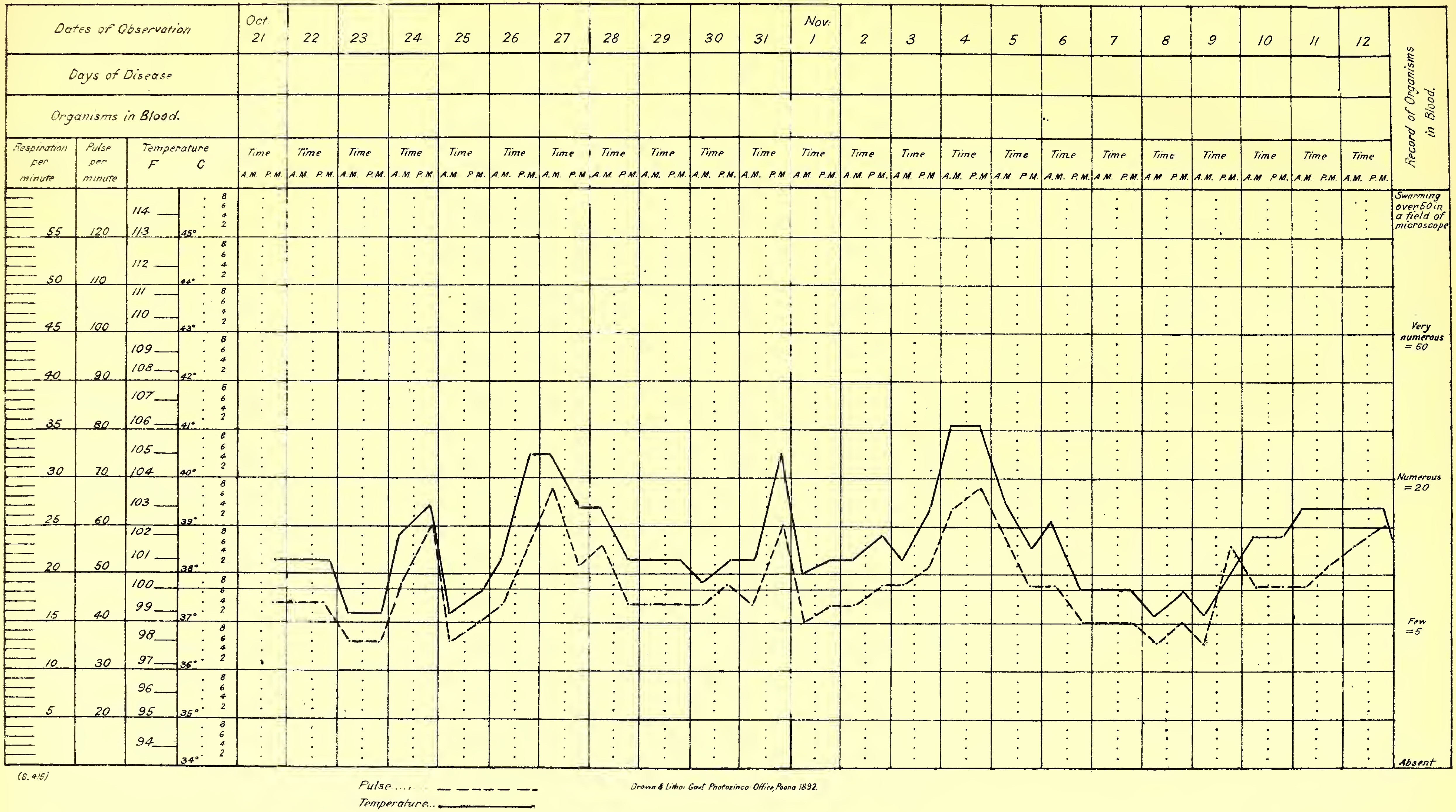
b.—MORBID PHENOMENA PRESENTED BY THE ORGANS OF CIRCULATION.

1. *The Pulse.*—This is accelerated ; it ranges between 30 and 90, and may each 120 just before death, but varies considerably in the different types of cases recognized in this disease, not only in frequency, but in rythm and force. At the commencement the pulse increases in frequency upon the first rise of temperature, and continues to do so, as long as the temperature becomes elevated, during the latent period of the disease; on the appearance of the organism in the blood the pulse may fall somewhat, but again rises and remains so during the paroxysm of fever, until the first apyrexial period, when it again falls to normal or thereabouts. A repetition of the above is observed in each fever and fever-free period, until towards the termination of the case by death, when the pulse increases in frequency, and at the time of death may attain 120 beats to the minute, or even more. It will be of interest to examine the charts

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Horse No. 472. Australian. Age, 11 Sex, Mare. Colour,

Disease, "Surra" naturally contracted. Date of Attack, Oct: 21 1888. Result, Death. Date of Result, 4.12.88. Register No.



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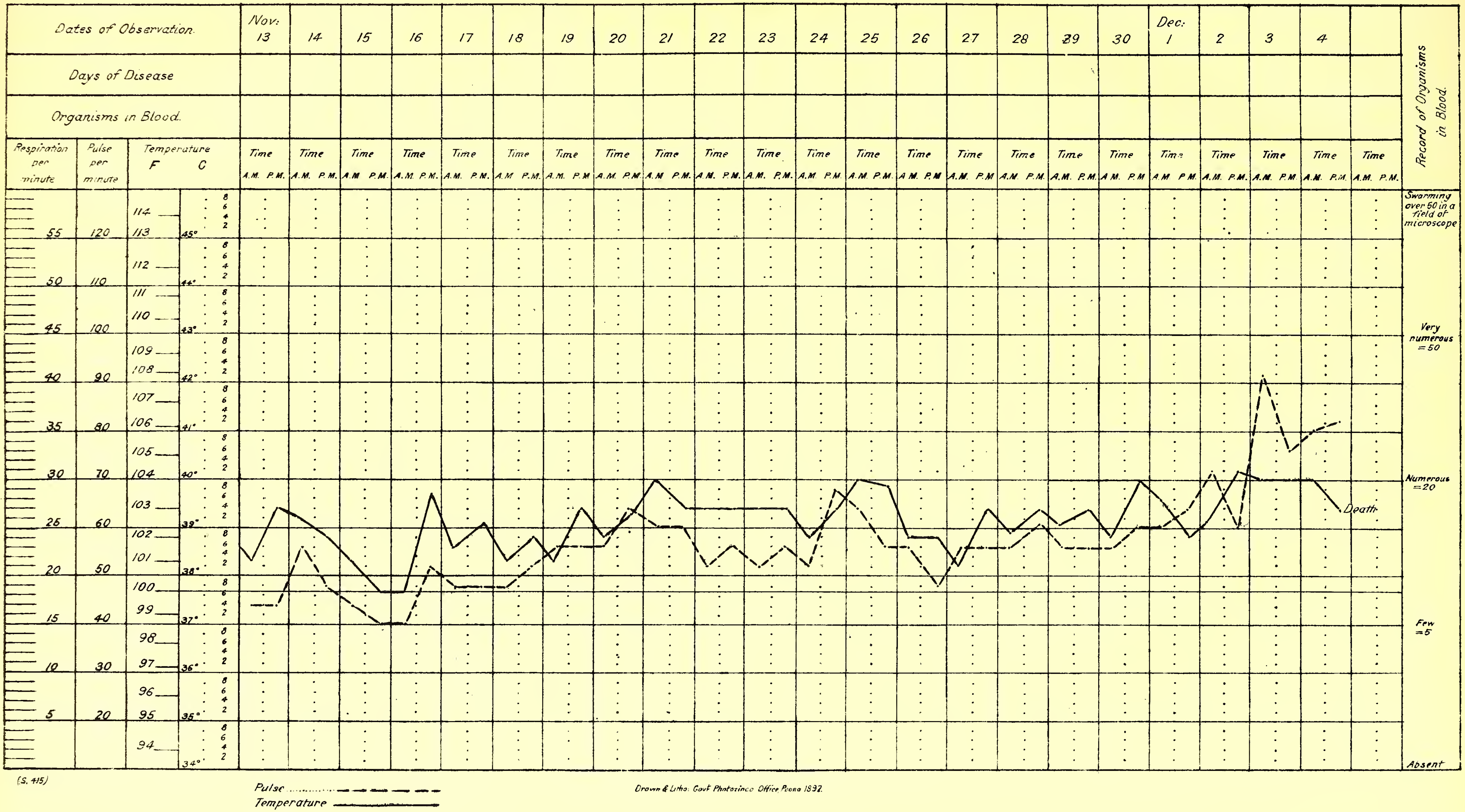
RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

No. 472 (Continued) ______ Age ______ Sex ______ Colour ______

Disease ______ Date of Attack ______ Result ______ Date of Result ______ Register No. ______



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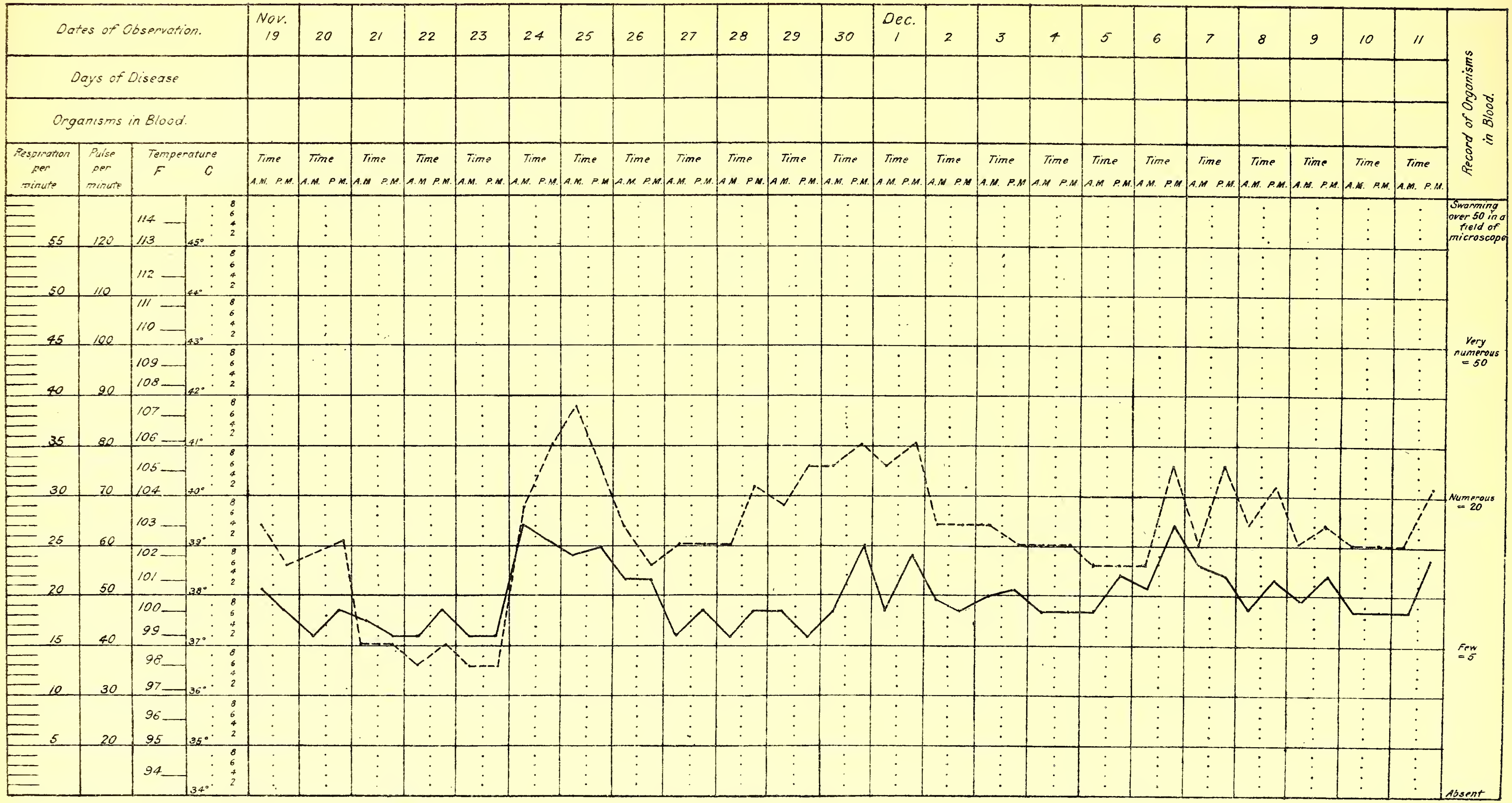
RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Horse Nº 356 ______ Age ______ Sex ______ Colour ______

Disease, Naturally contracted Surra ______ Date of Attack, 19-11-88 ______ Result, Death ______ Date of Result, 9-1-89 ______ Register No. ______



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Temperature ——————

Pulse .... — — — — —

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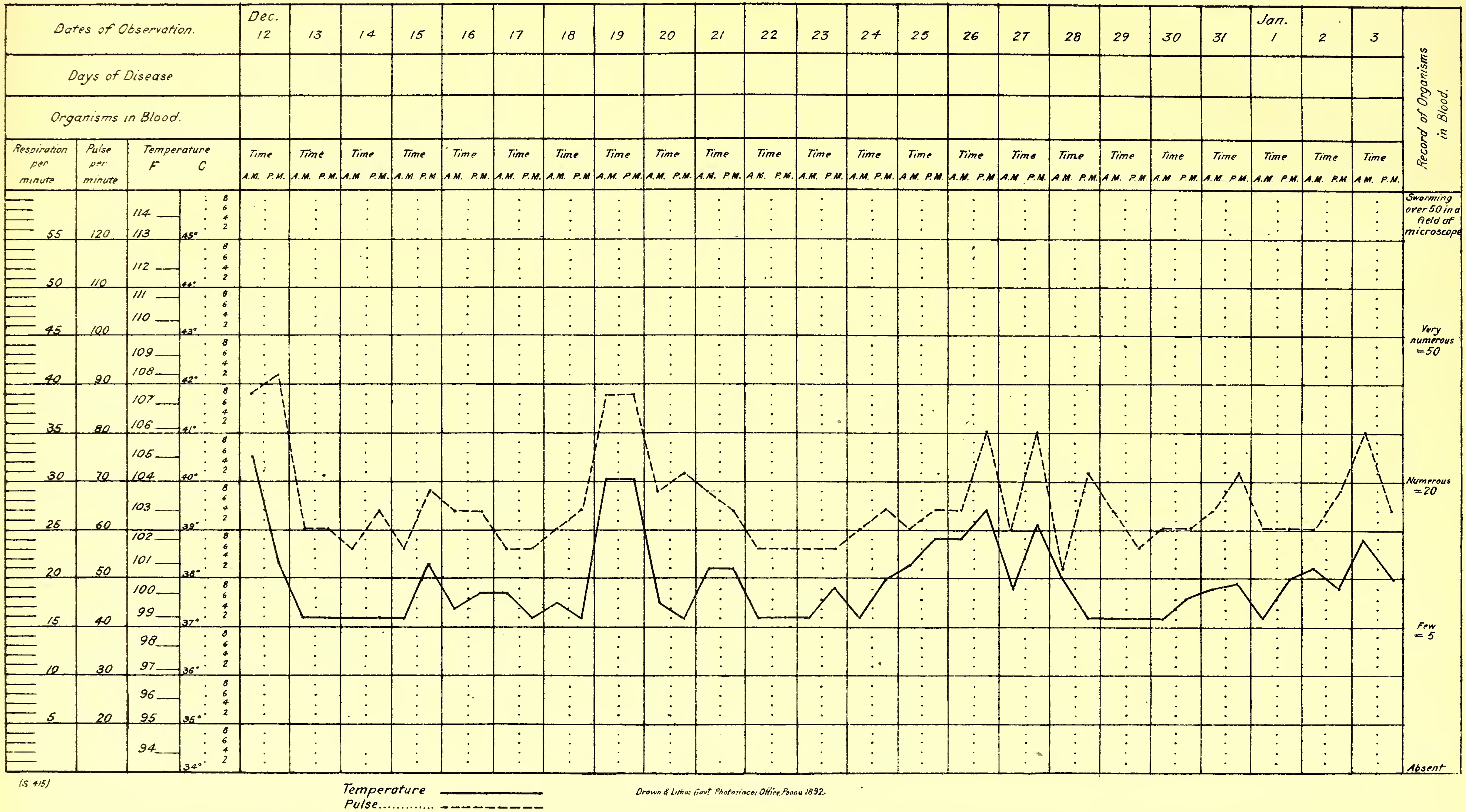
RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Nº 356 (continued) Age Sex Colour

Disease Date of Attack Result Date of Result Register No.



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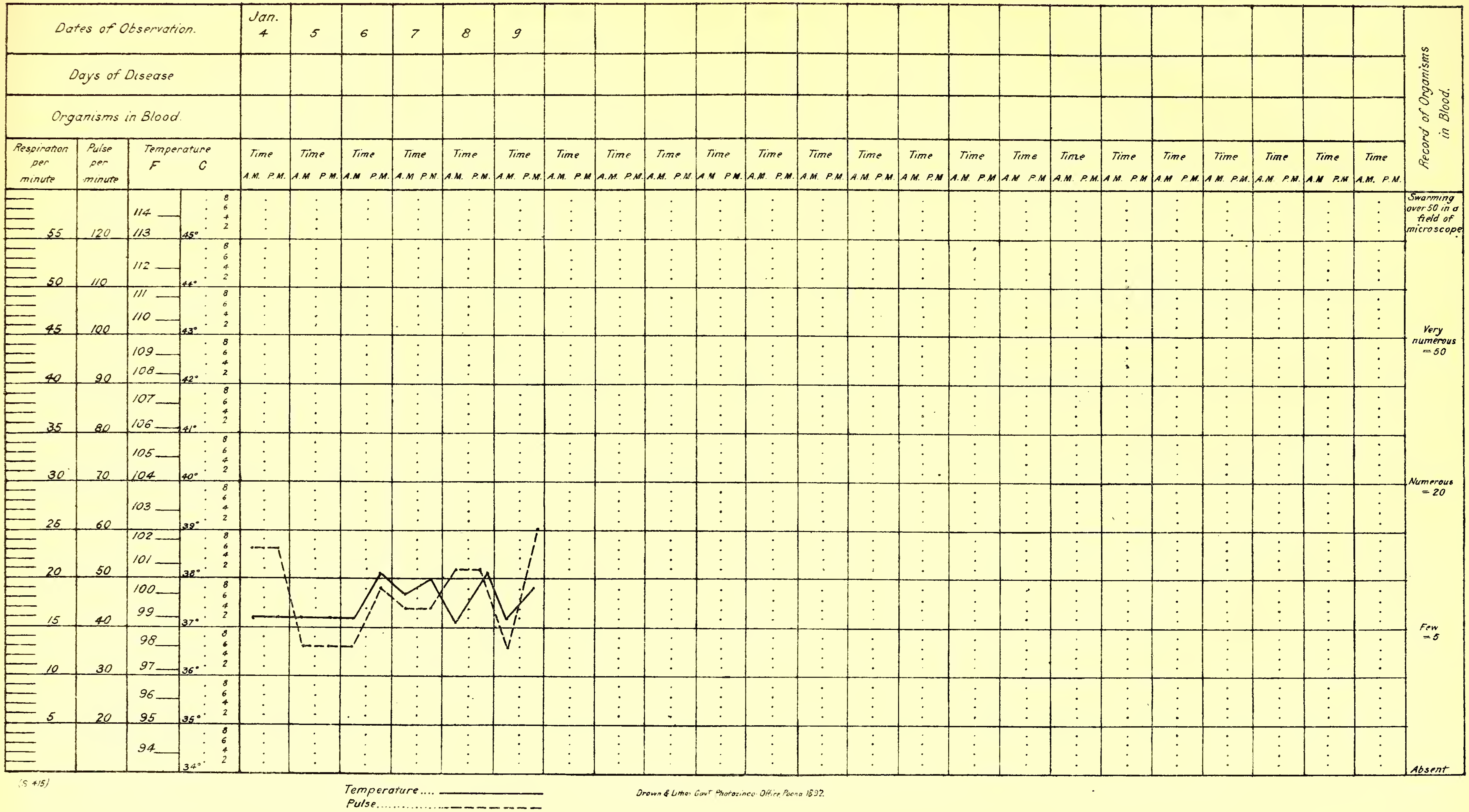
RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

No. 356 (continued) Age ______ Sex ______ Colour ______

Disease ______ Date of Attack ______ Result ______ Date of Result ______ Register No. ______



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Drawn & Litho: Govt. Photozinco: Office, Poona 1892.

of Horses Nos. 472 and 356, as examples of a point brought out by Steele, that "the tracing from the number of pulse beats resembles that from thermometer readings." In nearly every case of Surra, at one period or another, and usually during one of fever, the pulse presents unmistakeable signs of irregularity or intermission. I have noticed from one complete intermission in twelve beats, down to as many as one in four, but in most instances a few hours later, or on the following day, no trace of irregularity existed. During a period of fever the pulse may vary considerably in frequency, according to the elevation of the temperature, with or without intermissions ; the blood vessel during this time feels round, and dilated with a moderate tension, the access of the pulsation is sudden, and of short duration, and its subsidence abrupt, but is fairly easy of compression between the beats, the walls of the vessel feeling smooth and elastic. But a marked change appears during an apyrexial period, the frequency is diminished or normal; in many instances there is some irregularity, or the pulse intermits, the beat is weak and thready, the access being gradual, its duration long, and the subsidence slow, and the vessel feels flat, or at the most only half distended with blood.

When the disease has been running on for a variable period, there comes a time, only a few days before death, when continued fever usually accompanied by daily remissions takes the place of the former type. During this period the pulse is increased in frequency, 65 to 72 beats per minute, regular, but bounding, forcible and large, reminding one of the force of the pulse of aortic regurgitations, but in Surra the impulse is not visible in the carotids, or in the superficial arteries. At the time of death the frequency of the pulse is greatly increased, and may attain 120 or more beats per minute.

2. *Action of the heart.*—As a rule there is nothing noticeable with regard to this organ, until the disease is fairly advanced; when, after repeated attacks of fever, with the accompanying organisms in the blood, the animal becomes more and more dull and dejected in appearance; there is breathlessness on exertion, very often sleeplessness and inability to lie down, together with an incapacity for a sustained exertion ; the heart's action then becomes exceedingly irritable, and at a later date, when the bounding pulse appears as a result of the condition of the organ, its action becomes violent and tumultuous, so that not only is the animal swayed backwards and forwards by it, but by-standers are able to hear the sounds at a distance of a few feet. At this time also jugular regurgitation is observed, and distension of the superficial veins of the body, particularly those of the head, and the large external or subcutaneous thoracic vein, running from the flank towards the olecranon region.

c.—MORBID PHENOMENA PRESENTED BY THE ORGANS OF RESPIRATION.

1. *The Respirating Movements* are usually quickened from the first, sometimes out of all proportion to the pulse, so that they amount to 60 or 65 in the minute, quite independently of any pulmonary complication. The respirations appear frequently to be entirely abdominal, and in these cases the ribs are not seen to move at all. It has frequently been noted that animals present a peculiar form of breathing, when otherwise they appear fairly well, namely eight or nine shallow respirations are immediately followed by a deep sonorous one, and this condition may last for several hours (Case LXXII).

Cheyne-Stokes respiration was noted in one animal, No. XXXVII, shortly before death. In this case the animal had during the last few weeks of its life suffered from severe kidney complication.

2. *The Breath.*—During the greater part of the period the disease lasts the breath is free from odour, but in the majority of cases, towards its last phases, it becomes very fœtid, and in cases complicated with ozœna, the mere name is sufficient to describe the offensiveness of the discharge.

d.—MORBID PHENOMENA PRESENTED BY THE ORGANS OF DIGESTION.

(i). *The tongue.*—When the disease has fairly set in, the tongue and membranes of the mouth become extremely pale, and at a later date assume a yellow tinge. Some observers have noticed small symmetrically arranged ulcers, in pairs on the tip of the tongue, and sometimes a degeneration of the epithelium, which at a later date separates from the deeper part of the membrane, leaving superficial circumscribed ulcers.

(ii). *The appetite* usually ceases with the supervention of fever in the horse, but this disease is an extraordinary exception to the rule. In most cases from the very outset of the disease until death, which may occur weeks or even months later, the animal may never cease to eat all the food placed before it, and in numerous cases under my own observation, the bedding has been devoured during the hours of the night, the temperature at the time being 41·2°C.(106·1°F.) or even as high as 42°C.(107·6°F.). Evans remarks "some cases at last drop down and die suddenly, perhaps when they are eating and enjoying food * * * while other cases linger for days after they are down, too weak to rise or to stand after they are helped up, but go on eating all the grass they get, and much of the corn until they die."

"The appetite is excessive throughout the attack ; it is remarkable how the animal in a state of semi-coma will continue to eat grass almost without ceasing * * * Some patients stand and feed to the very last, and then drop dead." (Steele).

The following extract from the Report of the London Fever Hospital for 1843, has reference to Relapsing Fever of that year :—

"A peculiarity, very novel in character, was an inordinate desire for food ; this desire, so very unusual in fever, was all but universal. In some instances it was so uncontrollable, that no representation of the danger of indulgence, produced the slightest effect in pacifying the minds of the patients ; but many insisted on leaving the hospital long before their convalescence was sufficiently advanced, declaring that they preferred running all risks to enduring their constant sense of starvation. Several of these were brought back to the hospital in a few days, having relapsed into a hopeless state of fever."

(iii). *Gurgling.*—From a very early period, gurgling is present. In fact it would not be overstepping the truth to say, that this is a marked symptom in every case of this disease. It is frequently so pronounced as to be audible at some distance away from the animal.

(iv). *Meteorism* is an occasional symptom, which at times becomes sufficiently severe to require special treatment, but a brisk saline purgative is usually found to give great relief, though in some instances the symptom persists in spite of treatment.

(v). *Constipation.*—The rule is that the bowels are constipated, although diarrhœa coming on late in the disease is an occasional symptom. *Vide* case XX.

(vi). *Character of the stools.*—The stools retain for some time their natural colour and consistence, but frequently become lighter than normal. At a later period they are usually coated with a layer of mucus of a light brown colour, the dung balls presenting a glazed appearance, or at times may be tinged with blood. On microscopical examination of the brown mucus it is found to contain epithelium and a large number of colourless octohedral or polyhedral crystals. Towards the termination of a case, occasionally the dung becomes semi-solid or pultaceous in consistency, and then emits a very foul odour.

(vii). *Jaundice.*—Tinging of the membranes is a very constant symptom in every case at one period or another. It sometimes is a very early one, and at others does not make its appearance until well on in the disease. It may be evanescent in character, appearing with each paroxysm and gradually fading during the intermission, until the membranes become perfectly free and pallid, only to return with each exacerbation of the fever. In a second series of cases the colour is intense, and persists until death, when the tissues of the body will be found to present a deep crude gamboge colour. Even when there is little or no tinging of the mucous membranes at the time of death, the gelatinous exudation found so constantly in this disease, is always more or less tinged from a light yellow to a deep orange colour, and the material surrounding the base of the heart may be specially mentioned as being one of the most certain localities to observe it.

e.—MORBID PHENOMENA PRESENTED BY THE URINARY SYSTEM.

The quantity of urine in the early stage of the disease does not appear to vary to any great extent from that of health, but towards the latter end more is passed ; but this must naturally depend to a large extent upon the amount of water taken by the animal during the 24 hours, and upon the season of the year.

Colour.—The urine of the horse in health, on being allowed to stand until cool, is turbid and yellow in colour, carbonates of calcium and magnesium are precipitated. After the inoculation of Surra, the urine remains turbid, and becomes orange in colour, and later of a dingy green or greenish yellow ; if the kidneys become affected, the quantity secreted is diminished, and the density of the fluid is increased, and the colour changed to that of cream or a light yellow ochre ; the latter colour only lasts for a few days, four at the most, and then the fluid assumes a greenish-yellow or dirty orange. In some horses the fluid passed is very viscid, but not in all ; however in the case of mares it is usually so from the first, and remains so, as long as the urine is alkaline, but immediately the fluid becomes acid, the viscidity as a rule diminishes.

Specific Gravity.—The range observed in the specific gravity is very considerable, and in the same animal may widely differ from day to day. In the case of Horse No. LXXII (*vide* chart) it was as low as 1,004 on the 19th October 1892, and rose to 1,034 on the 20th, and 1,046 on the 23rd.

The highest registered in any case was 1,055—Horse No. XXVI—31st October 1891.

The re-action of the urine of horses is always alkaline in health, but varies according to the food given. In this country the urine of animals fed upon oats is acid in re-action, while on the contrary when supplied with grass and gram the re-action is alkaline. When a horse is the subject of Surra, especially in long protracted cases, the urine remains alkaline until some seven or eight days before death, when it is found to change and become respectively feebly alkaline, at the expense of the Carbonates of Calcium and Magnesium, neutral on the following day, then slightly acid, and finally strongly acid ; and this acid condition of the secretion is maintained until death takes place; in some cases for as long as six days.

Urea.—The quantity of urea passed during the paroxysms and apyrexial stages is at present under investigation. It appears however that the amount of urea excreted, is increased to a considerable extent immediately after the infusorian appears in the blood. During the paroxysms the amount undergoes a slight decrease, rising again during the absence of the hæmatozoon from the blood. It is a point of considerable interest that the maximum excretion of urea generally takes place during the second intermissions, and after this period gradually diminishes with perhaps a slight occasional rise, until the animal succumbs. This question however, requires further investigation, and is now being carefully worked out.

Uric acid is not increased in the horse, but in the ass it has been found to be present previous to inoculation, and to absent itself after the appearance of the hæmatozoon in the blood.

Phosphates are occasionally present, but in the great majority of cases are totally absent in any appreciable amount.

Albumen.—This does not appear until some little time after the first appearance of the hæmatozoon in the blood ; and then only in small quantities, without the animal develops signs of the kidneys being specially affected. In case XXXVIII the animal presented well-marked symptoms of the kidneys having become involved. On examination of the urine, epithelial blood and granular casts were found daily ; so that evidently the animal was the subject of an acute disquamnative nephritis.

Sugar never found, although often examined for.

Bile pigments frequently present.

Retention and incontinence of urine have not been observed in horses.

f.—MORBID PHENOMENA REFERABLE TO THE ORGANS OF SPECIAL SENSE.

(i).—*Organs of Vision.*

Lachrymation.—This at first is slight, but in some animals rapidly increases in amount until it becomes profuse. At a varying period in the disease, there appears at the inner canthus a semi-gelatinous secretion, which may become muco-purulent in character, and during the presence of the hæmatozoon in the blood in large numbers, slight hæmorrhages take place from the conjunctival membranes, and the secretion becomes blood-stained. At these times it always contains the hæmatozoon in varying numbers.

Petechiæ.—This is not the only disease in which petechiæ, or more extensive extravasations occur; for they are usually present in anthorax, so-called bilious fever, petechial fever, and other diseases; also when an animal is suffering from the presence of small nœmatodes in the general circulation. In 'Surra' the petechiæ on the conjunctival membranes are specially prone to invade the membrana nictitans of the equidæ, and frequently attain a large size, becoming relatively extensive extravasations, they may precede the discovery of the hæmatozoon, but as a rule are found shortly after the first appearance of the organism in the blood, and commence to fade immediately it disappears; and as each successive brood of the hæmatozoon make their debût, a fresh crop of petechiæ appear on the membranes, and it often happens that a second series of petechiæ are present before the first have completely faded.

Opacity of the Cornea.—Complete opacity is of rare occurrence, but towards the termination of a long case, a slight milkiness of the cornea may be observed, and is not at all infrequent. I have, however, seen one case in an Arab horse, where complete opacity occurred a few days before death, and therefore blindness supervened.

Hæmorrhages into the anterior chamber occasionally occur, but the amount of blood is generally small. The colour at first is red, and after a period of 24 hours or more, the colouring matter is absorbed, leaving the extravasated mass either of a whitish hue, or somewhat yellow in the case of an animal in which the membranes are already tinged that colour. As a rule no absorption of the extravasated material takes place, owing to the short period which elapses between the occurrence of it and death.

Hæmatozoon in the fluid of the anterior chamber and Vitreous Humour.—On several occasions the presence of the 'Surra' organisms has been verified in both of these fluids.

(ii).—*Organs of Smell.*

Discharge from the nostrils.

Ulceration inside the nostrils.—One observer, Steele, mentions the occasional occurrence in mules, of ulcers on the Schneiderian membrane, when the epithelial débris remains as a yellow scab for a day or two, and is then washed away by mucus; the earliest appearance of these ulcers in the nose is as though the membrane had been grazed, and blood was slowly oozing; they rapidly disappear and the general character of the membrane becomes normal. I have not observed these, however, in the cases of naturally acquired, or in the inoculated cases of Surra.

Petechiæ and injection of the nasal septum.—The presence of minute petechiæ on the walls of the *septum nasi* is of very constant occurrence. The mucous membrane covering the cartilage is tumefied, and presents small red points from which minute drops of blood exude; these appear as if they might have been produced by punctures of a large number of needles, so minute are they. This condition does not show itself until the animal has been ill for some days, and then they might be easily overlooked without a certain amount of care in observation.

Thickening and intense tumefaction of the Schneiderian membrane.—This condition is frequently met with, more especially at an advanced stage of the disease. A peculiar sound is produced by the entrance of air, and its exit from the nasal passages, due to the swollen condition of the mucous membrane lining the cavities. On examination a congested and arborescent condition of the vessels is found, particularly well-marked on the upper part of the nasal septum.

Epistaxis.—Bleeding from the nose has been observed once out of some 72 cases of Surra. It occurred towards the termination of the disease. No great amount of blood was lost at one time, but was characterized by recurrent attacks, which principally occurred during the early morning.

Discharge from the nostrils.—During the second week after invasion, there is often a slight discharge of clear fluid from one or both nostrils. This is the result of excessive lachrymation, which appears to a greater or less extent in all 'Surra' animals; the fluid passes down the lachrymal duct into the nostrils, and at a later date a clear albuminous fluid is noticed running from one or both of the latter. This comes from the nasal passages proper, and is the result of an inflammatory condition of the membrane covering the turbinated bones. This fluid after a time becomes muco-purulent in character, and another symptom is to be noticed, viz., snuffling-breathing, which points to the situation and cause of the discharge. If one could examine the mucous membrane covering the turbinated bones at this stage, it would be found to present a deep red or purple colour, from the highly congested condition of the capillary vessels, and to be considerably increased in thickness.

SECTION VIII.

STAGES AND DURATION OF SURRA.

A. Stages.—The fever of Surra as before mentioned varies to such an extent in different cases, that it is impossible to group any number of them, under any one system of description as regards the stages of the disease. The insidious nature of the onset in the naturally contracted disease, devoid of symptoms during a considerable period, renders it impossible to recognize it, until such time as the organism appears in the blood. Consequently little is known concerning the latent period and stage of invasion, and in such cases, when untreated, the fever is of a continued type, followed by one or more intermissions at long but irregular intervals.

In this disease, when artificially produced, the majority follow the type before mentioned, but a number present a peculiar series of symptoms, reminding one of relapsing fever in man. But here again certain variations are observed. Such cases as Nos. XX, XXXVIII, L, LIV, however, lend themselves to description, which will be made clear on reference to the charts, and may be described as presenting well marked stages, viz. :—

I.—The period of incubation, or latent period.
II.—The primary paroxysm.
III.—The intermission.
IV.—The relapse.
V.—Death.

The paroxysms ' as in relapsing fever in man, are again sub-divisible into the accession, the pyrexial stage, and the crisis. But in all cases of Surra, we find periods during which the hæmatozoon is present, and others during which it is absent.

The only system therefore under which all cases can be grouped, is that having for its basis the presence and absence of the organism, the former we term the paroxysm, and the latter the period of intermission.

In the following tables will be found a complete analysis of the whole of the cases :—

TABLE

Showing the number of Paroxysms and Intermissions which occurred in the course of each case, together with their

Number.	Animal.	Fluid used.	Quantity used.	Fluid taken from what animal.	A. M. or P.M.	Date of Inoculation.	How administered.	Latent Period.		Hæmatozoon.		I. Paroxysm.			I. Intermission.	
								Length in days.	Maximum and Minimum Temperatures °C.	Date of first appearance.	Temperatures °C at the time of 1st appearance.	Length in days.	Maximum and Minimum Temperatures °C.	Maximum number of Hæmatozoa.	Length in days.	Maximum and Minimum Temperatures °C.
III	Arab Gelding ...	?	...	...	...	...	Nat: contracted.	...	...	14 10 90	...	8	40·9 38·5	N.	2	39·3 38·6
LXV	Australian mare ...	Polluted Water.	...	...	...	...	,, ...	...	...	23 5 92	...	8	41·1 39·2	N.	27	41·1 38·0
LXX	,, Gelding.	?	...	...	...	...	,, ...	...	...	23 9 92	40·5	4	40·8 39·3	V.N.	1	40·6 40·4
LXXI	,, Mare ...	?	...	...	...	...	,, ...	...	...	23 9 92	...	2	40·6 40·0	V.N.	5	39·3 37·5
LXXII	,, Gelding.	?	...	...	...	...	,, ...	...	...	7 10 92	...	8	40·7 38·1	S.	1	39·8 39·0
LXXIII	,, Gelding.	?	...	...	...	...	,, ...	...	...	30 10 92	...	...	...	...	2	38·3 37·7
LXXIV	Arab Gelding ...	?	...	...	...	...	,, ...	...	...	7 11 92	39·4	9	41·0 37·0	V.N.	3	39·2 37·7
LXXVI	Australian Gelding.	?	...	...	...	...	,, ...	...	...	25 11 92	...	1	40·0 39·2	F.	1	39·7 39·1
LXXVII	Persian Gelding ...	?	...	...	...	...	,, ...	...	...	27 11 92	...	4	40·3 38·0	V.N.	3	39·3 37·4
LXXVIII	Australian Mare ...	?	...	...	...	...	,, ...	...	...	6 12 92	38·7	5	40·1 38·3	S.	7	41·0 38·5
LXXIX	,, Gelding.	?	...	...	...	...	,, ...	...	...	6 12 92	...	3	41·3 39·0	V.N.	13	40·3 36·7
LXXX	,, Mare ...	?	...	...	...	...	,, ...	...	...	10 12 92	39·4	3	40·6 38·7	V.N.	44	40·1 36·5
LXXXI	Herati Mare ...	?	...	...	...	...	,, ...	...	...	18 12 92	39·4	7	40·1 37·6	N.	1	39·1 37·5
LXXXII	Australian Mare ...	?	...	...	...	...	,, ...	...	...	18 12 92	40·3	3	40·3	V.N.	1	38·2 37·6
LXXXIV	Persian Gelding ...	?	...	...	...	...	,, ...	...	...	23 1 93	40·0	5	40·5	V.N.	11	39·7 37.·3
XX	Horse	Blood ...	* 291 Ms. ...	Horse No, XXIII	A.M.	28 6 91	By Gastric ingestion.	75	38·6 36·4	11 9 91	39·4	5	40·8 39·2	S.	3	39 6 38·2
XIV	,, ...	,, ...	0·7c.c. ...	,, XI	A.M.	30 1 91	Directly into I. J. Vein.	5	40·1 36·2	4 2 91	38·4	8	40·1 38·0	V.N.	1	40·4 38·2
XV	,, ...	,, ...	0·8c.c. ...	,, XI	A.M.	30 1 91	,, ...	6	39·1 37·4	5 2 91	39·0	6	39·9 38·0	V.N.	1	39·9 39·6
V	,, ...	,, ...	3·0c.c. ...	,, IV	A.M.	18 11 90	Subcut: inoc.	4	39·2 37·8	22 11 90	38·2	3	39·6 36·8	V.N.	Death.	
VIII	,, ...	,, ...	1·0c.c. ..	,, VII	A.M.	19 12 90	,, ,,	5	40·2 37·4	24 12 90	40·0	4	41·3 38·8	V.N.	3	40·1 38·2
VI	,, ...	,, ...	1·0c.c. ...	,, IV	A.M.	22 11 90	,, ,,	5	38·2 37·4	27 11 90	37·9	2	39·4 37·8	N.	1	40·1 38·8
XXII	,, ...	,, ...	1·0c.c. ...	,, XXI	A.M.	29 5 91	,, ,,	4	38·5 37·1	2 6 91	37·6	7	41·1 37·5	S.	1	40·8 40·3
IV	,, ...	,, ...	1·0c.c. ...	,, III	A.M.	8 11 90	,, ,,	8	39·8 36·3	16 11 90	39·2	18	41·1 37·3	V.N.	Death.	
XXX	,, ...	,, ...	1·0c.c. ...	,, XXIII	A.M.	7 7 91	,, ,,	7	38·4 36·4	14 7 91	36·5	2	38·8 35·7	V.N.	Death.	
XIII	,, ...	,, ...	1·0c.c. ...	,, XIX	A.M.	29 4 91	,, ,,	8	38·4 37·4	7 5 91	37·4	5	40·5 37·6	V.N.	2	40·3 38·8
XXI	,, ...	,, ...	1·0c.c. ...	,, XIX	A.M.	29 4 91	,, ,,	8	40·4 38·1	7 5 91	39·9	6	41·7 39·1	V.N.	1	39·9 39·7
XXIX	,, ...	,, ...	0·8c.c. ...	,, XXIII	A.M.	7 7 91	,, ,,	7	37·8 35·5	14 7 91	36·6	5	40·7 36·5	S.	Death.	
LXIV	,, ...	,, ...	0·5c.c. ...	,, LXV	A.M.	14 6 92	,, ,,	7	39·4 36·6	21 6 92	37·6	17	41·2 37·6	S.	Death.	
XLVIII	,, ...	,, ...	0·5c.c. ...	,, L	A.M.	12 11 91	,, ,,	10	40·0 35·6	22 11 91	37·0	1	38·8 37·0	N.	Death.	
XII	,, ...	,, ...	Minim J ...	,, XIX	A.M.	5 4 91	,, ,,	6	38·5 38·2	11 4 91	38·6	7	40·9 38·5	V.N.	3	40·1 39·4
LIX	,, ...	,, ...	0·5c.c. ...	,, LVIII	A.M.	3 5 92	,, ,,	5	38·3 37·5	8 5 92	37·4	13	41·2 37·4	S.	Death.	
LIV	,, ...	,, ...	0·1c.c. ...	,, LVI	A.M.	26 12 91	,, ,,	4	38·7 36·2	30 12 91	37·8	5	41·8 37·1	N.	2	38·0 37·1
LV	,, ...	,, ...	0·1c.c. ...	,, LIV	A.M.	5 2 92	,, ,,	6	40·0 37·4	11 2 92	39·4	5	41·6 39·2	S.	1	39·4 39·3
XXIV	,, ...	,, ...	A fraction of minim j .	,, XXII	A.M.	15 6 91	,, ,,	7	39·2 36·8	22 6 91	37·8	15	40·5 37·6	V.N.	Death.	
XVIII	,, ...	,, ...	2·0c.c. ...	,, XV	P.M.	12 3 91	,, ,,	13	37·8 36·8	25 3 91	38·6	6	38·7 38·0	V.N.	2	38·1 37·2
XIX	,, ...	,, ...	2·0c.c. ...	,, XV	P.M.	12 3 91	,, ,,	9	41·2 36·4	21 3 91	39·1	9	39·3 37·2	V.N.	1	37·7 37·5
XXVII	,, ...	,, ...	2·0c.c. ...	,, XXX	P.M.	16 7 91	,, ,,	11	38·4 35·7	27 7 91	37·5	2	37·6 35·1	S.	Death.	
LVIII	,, ...	,, ...	1·0c.c. ...	,, XLVII	P.M.	29 3 91	,, ,,	9	40·4 38 1	7 4 91	39·5	5	41·5 39·5	V.N.	3	39·6 38·1
XXIII	,, ...	,, ...	1·0c.c. ...	,, XXI	P.M.	4 6 91	,, ,,	8	37·6 36·5	12 6 91	36·8	5	40·1 36·8	S.	3	38·9 37·4
XLVI	,, ...	,, ...	1·0c.c. ...	,, XLVIII	P.M.	23 11 91	,, ,,	8	38·6 35·5	1 12 91	38·1	7	40·1 36·8	S.	Death.	
XI	,, ...	,, ...	1·0c.c. ...	,, VIII	P.M.	11 1 91	,, ,,	11	40·5 37·6	22 1 91	38·5	3	39·5 38·5	N.	1	38·8 38·1
XXXII	,, ...	,, ...	0 3c.c. ...	,, XXIII	P M.	11 7 91	,, ,,	9	37·3 35·4	20 7 91	37·3	1	38·0 37·1	N.	Death.	
VII	,, ...	Serum ...	1·0c.c. ...	,, III	P.M.	10 12 90	,, ,,	8	39·3 37·2	18 12 90	39·6	9	40·9 38·5	V.N.	Death.	
XXXIII	,, ...	Serous fluid, Tunica Vaginalis Testis.	1·0c.c. ...	Goat No. III.	A.M.	25 7 91	,, ,,	5	37.2 36·1	30 7 91	36·6	8	40·1 36·7	S.	1	40·0 38·6
XXXIV	,, ...	Blood ...	1·0c.c. ...	Horse XXXI.	A M.	2 8 91	,, ,,	12	37·3 35·1	14 8 91	35·7	2	38·9 35·5	V.N.	Death.	
XXXVIII	,, ...	,, ...	1·0c.c. ...	,, XL.	P.M.	26 8 91	,, ,,	9	40·0 36·6	4 9 91	40·6	3	41·2 38·0	V.N.	1	38·6 37·8
XLI	,, ...	,, ...	1·0c.c. ...	,, XL.	P.M.	26 8 91	,, ,,	7	37·8 36·3	2 9 91	36·6	1	37·8 36·6	V.N.	Death.	

* 291 minims=17·17 c.c.

tion, Maximum and Minimum Temperatures, and the maximum number of hæmatozoa present during the former.

II. roxysm.		II. Intermission.		III. Paroxysm.			III. Intermission.		IV. Paroxysm.			IV. Intermission.		V. Paroxysm.			V. Intermission.		VI. Paroxysm.			VI. Intermission.		VII. Paroxysm.			VII. Intermission.	
mum Temperatures °C.	Maximum number of Hæmatozoa.	Length in days.	Maximum and Minimum Temperatures °C.	Length in days.	Maximum and Minimum Temperatures °C.	Maximum number of Hæmatozoa.	Length in days.	Maximum and Minimum Temperatures °C.	Length in days.	Maximum and Minimum Temperatures °C.	Maximum number of Hæmatozoa.	Length in days.	Maximum and Minimum Temperatures °C.	Length in days.	Maximum and Minimum Temperatures °C.	Maximum number of Hæmatozoa.	Length in days.	Maximum and Minimum Temperatures °C.	Length in days.	Maximum and Minimum Temperatures °C	Maximum number of Hæmatozea.	Length in days.	Maximum and Minimum Temperatures °C.	Length in days.	Maximum and Minimum Temperatures °C.	Maximum number of Hæmatozoa.	Length in days.	Maximum and Minimum Temperatures °C,
41·0 38·0	N.	3	40·3 37·9	4	41·0 37·7	N.	3	39·5 37·7	6	40·6 38·4	N.	5	40·6 38·4	3	39·9 37·3	N.	Death.		...	...	...	...	...	...	...	...	...	...
41·0 39·3	V. N.	8	40·7 39·7	Death.		..	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
0·7 39·3	N.	3	41·3 39·8	4	41·0 39·2	F.	2	40·2 39·1	6	40·8 38·8	N.	4	40·3 39·1	Death.		...	...	...	...	...	...	...	...	...	...	...	...	...
41·0 37·5	V. N.	2	38·5 37·1	2	39·1 38·4	F.	12	40·6 38·4	Death.		...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
0·1 39·0	F.	26	40·4 36·7	2	41·4 39·0	N.	Death.		...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
0·5 8·1	N.	10	40·5 37·0	2	41·7 38·2	N.	5	39·0 37·0	4	40·8 37·7	N.	84	39·4 35·8	Death.		...	...	...	...	...	...	...	...	...	...	...	...	...
0·8 9·0	N.	4	39·4 36·5	1	38·0 37·4	F.	17	39·3 36·5	Death.		...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
0·1 7·0	V. N.	27	39·3 35·8	Death.		...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
8.2 7·2	F.	26	38·7 37·0	1	38·8 37·6	F.	1	38·8 38·0	2	40·1 38·7	F.	15	40·0 37·8	10	39·1 35·0	V. N.	Death.		...	...	...	...	...	...	...	...	...	...
.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
0·4 8·0	F.	4	39·6 36·8	5	40·7 37·4	N.	1	38·4 37·8	6	40·5 37·6	F.	5	40·8 38·1	5	40·4 39·1	V. N.	1	38·5 37·4	8	39·8 36·8	N.	1	36·8	Death.		...	...	...
0·6 9·0	N.	64	39·1 35·5	Death.		...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
9·3 7·2	N.	Death.		...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1·0 7·7	S.	1	37·7 36·6	4	42·1 37·7	V. N.	3	38·7 37·2	6	40·0 37·4	V. N.	1	38·4 38·4	14	40·6 37·6	S.	Death.		...	...	...	...	...	...	...	...	...	...
·7 6·1	V. N.	Death.		...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
9·4 7·7	N.	2	41·8 39·5	3	39·6 37·2	N.	5	41·1 38·0	8	39·9 38·6	N.	Death.		...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
..	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
·6 ·0	N.	1	39·5 38·2	2	39·4 37·0	N.	Death.		...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
·6 ·0	N.	3	39·4 37·2	8	41·0 37·8	N.		38·9 38·6	7	41·1 48·6	N.	1	39·4 39·0	8	41·4 39·5	N.	6	40·3 38·8	6	38·8 36·7	V. N.	Death.		...	...	...	...	...
·0 ·2	V. N.	Death.		...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
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·1 ·8	N.	3	39·6 38·0	7	39·7 38·1	V. N.	2	38·7 37·3	5	40·4 38·1	N.	1	38·4 36·7	2	37·4 36·6	S.	Death.		...	...	...	...	...	...	...	...	...	...
·4 ·6	V. N.	1	38·6 38·2	5	40·9 38·7	V. N.	1	38·9 38·7	10	40·4 38·2	S.	Death.		...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
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·3 ·8	V. N.	Death.		...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
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·0 ·3	N.	3	38·2 37·2	1	41·0 40·4	V. N.	4	38·5 37·4	2	42·1 38·2	N.	2	38·2 37·5	2	41·4 37·4	V. N.	3	40·0 38·7	13	40·4 38·6	S.	Death.		...	...	...	...	...
·0 ·5	S.	4	40·5 37·7	8	41·3 38·2	S.	Death.		...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
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·2 ·5	V. N.	Death.		...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
·2 ·8	V. N.	2	39·8 38·5	16	40·5 38·1	V. N.	1	39·6 38·6	6	40·2 38·7	S.	3	40·4 37·5	6	40·6 39·4	V. N.	Death.		...	...	...	...	...	...	...	...	...	...
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·1 ·1	S.	2	39·1 38·0	6	41·7 38·5	V. N.	2	40·7 33·4	3	41·3 40·0	V. N.	2	40·2 38·8	1	42·0 39·8	F.	Death.		...	...	...	...	...	...	...	...	...	...
·0 ·2	S.	Death.		...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
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·8 ·5	F.	2	38·7 37·7	16	41·6 38·3	N.	1	39·9 38·7	3	38·9 38·0	V. N.	5	40·3 38·0	3	39·5 39·1	N.	1	38·4 38·3	1	39·9 39·7	N.	2	39·5 39·1	2	39·4 36·3	N.	Death.	
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·8 ·1	S.	Death.		...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
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·4 ·0	V. N.	3	38·8 37·1	2	41·6 37·4	S.	3	38·1 37·4	2	42·0 38·0	V. N.	3	38·8 37·6	7	41·8 37·5	V. N.	2	38·4 37·5	4	41·0 37·8	S.	3	38·6 38·0	9	...	S.	Death.	
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TABLE

Showing the number of Paroxysms and Intermissions which occurred in the course of each case, together with their

Number.	Animal.	Fluid used.	Quantity used.	Fluid taken from what animal.	A. M. or P. M.	Date of Inoculation.	How administered.	Latent Period.		Hæmatozoon.		I. Paroxysm.			I. Inter-mission.	
								Length in days.	Maximum and Minimum Temperatures °C.	Date of 1st appearance.	Temperature °C at the time of 1st appearance.	Length in days.	Maximum and Minimum Temperatures °C.	Maximum number of Hæmatozoa.	Length in days.	Maximum and Minimum Temperatures °C.
XL	Horse	Blood ...	0·6c.c. ...	Horse No. XXXIV	P.M.	15 8 91	Subcutane-. ously inoculated.	6	37·3 36·0	21 8 91	39·0	5	39·6 37·3	S.	Dea	th.
XXXI ...	,, ...	,, ...	0·3c.c. ...	Do. XXXIII	P.M.	11 7 91	Do. ...	9	37·6 35·7	20 7 91	38·2	13	39·8 36·5	S.	Dea	th.
L	,, ...	Blood serum.	2·0c.c. ...	Do. XXXVIII	P.M.	15 10 91	Do. ...	9	40·9 37·2	24 10 91	37·6	2	41·0 37·8	V. N.	1	39·5 38·8
I	Donkey	Blood ...	2·0c.c. ...	Do. LXXXIV	P.M.	9 2 93	Do. ...	4	38·2 35·6	13 2 93	36·2	9	41·0 35·0	S.	Dea	th.
I	Bull	,, ...	1·75c.c. ...	Do. XIX	A.M.	24 3 91	Do. ...	5	39·8 38·2	29 3 91	39·2	1	39·3 39·2	F.	1	39·9 39·8
(i)	Guinea-pig ...	,, ...	0·2c.c. ...	Bull No. I	A.M.	17 6 91	Do. ...	10	40·8 38·4	27 6 91	39·8	2	40·4 40·0	N.	5	40·2 39·1
(ii)	,, ...	,, ...	0·2c.c. ...	Do.	A.M.	17 6 91	Do. ...	18	41·0 38·4	5 7 91	39·1	1	39·4 39·1	F.	1	39·3 39·2
(iii)	,, ...	,, ...	0·2c.c. ...	Do.	A.M.	3 9 91	Do. ...	9	39·8 38·6	12 9 91	40·7	4	40·8 39·4	N.	2	39·6 39·0
(iv)	,, ...	,, ...	0·2c.c. ...	Do.	A.M.	3 9 91	Do. ...	9	39·3 38·4	12 9 91	40·7	4	40·7 39·4	N.	2	39·3 38·7
(i)	,, ...	,, ...	0·7c.c. ...	Sheep No. I	A.M.	24 1 91	Do. ...	10	39·8 37·9	3 2 91	38	2	39·8 38·0	N.	1	39·6 39·5
(ii)	,, ...	,, ...	0·7c.c. ...	Do.	A.M.	24 1 91	Do. ...	14	39·6 38·2	7 2 91	39	4	39·8 39·0	N.	3	39·7 39·2
												3	VIII 41·3 39·8	F.	1	41·1 40·8
I	Goat	,, ...	0·5c.c. ..	Horse No. II	A.M.	4 11 90	Do. ...	6	41·2 38·9	10 11 90	42·2	3	42·1 39·2	F.	4	41·8 39·1
III	,, ...	,, ...	1·0c.c. ...	Do. XXI	P.M.	4 6 91	Do. ...	6	40·2 38·8	10 6 91	38·8	2	39·5 38·8	F.	5	39·9 39·2
I	Rabbit	,, ...	0·3c.c. ...	Do. II	A.M.	2 11 90	Do. ...	5	40·5 39·3	7 11 90	40·8	1	41·0 40·8	F.	3	41·2 40·7
												2	VIII 40·1 40·0	F.	Dea	th.
II	,, ...	,, ...	0·3c.c. ...	Do. II	A.M.	2 11 90	Do. ...	9	41·7 39·4	11 11 90	41·5	1	41·2 40·8	F.	3	41·7 40·6
I	Guinea-pig ...	,, ...	1·0c.c. ...	Do.	A.M.	2 11 90	Do. ...	11	39·8 39·2	13 11 90	39·1	44	40 6 39·0	S.	Dea	th.
II	,, ...	,, ...	1·0c.c. ...	Do.	A.M.	2 11 90	Do. ...	9	39·8 39·0	11 11 90	39·4	5	39·8 39·1	N.	2	39·7 38·8
III	,, ...	,, ...	0·5c.c. ...	Do. IV	A.M.	24 11 90	Do. ...	7	41·0 39·2	1 12 90	40·9	3	41·1 40·1	F.	3	41·1 40·5
(i)	,, ...	,, ...	0·2c.c. ..	Do. XI	A.M.	4 2 91	Do. ...	6	39·8 38·9	10 2 91	40·2	12	40·4 38·5	V. N.	1	38·5 38·3
(ii)	,, ...	,, ...	0·2c.c. ...	Do.	A·M.	4 2 91	Do. ...	6	39·8 38·4	10 2 91	39·5	50	40·9 38·5	V. N.	1	39·8 39·7
												1	VIII 40·4 40·1	F.	2	40·3 39·9
												4	XV 40·7 39·0	V. N.	2	40·2 39·4
1	Rat (M. dec.) ...	,, ...	0·2c.c. ...	Do. V11	A.M.	19 12 90	Do. ...	1	...	20 12 90	...	7	...	S.	Dea	th.
II	,, ...	,, ...	0·1c.c. ...	Do.	A.M.	23 12 90	Do. ...	2	...	25 12 90	...	7	...	V. N.	Dea	th.
III	,, ...	,, ...	0·1c.c. ...	Do.	A.M.	23 12 90	Do. ...	2	...	25 12 90	...	7	...	S.	Dea	th.
I	Rat (Nes. prov.) ...	,, ...	0·2c.c. ...	Do.	A.M.	26 12 90	Do. ...	2	...	28 12 90	...	11	...	S.	Dea	th.
II	,, ...	,, ...	0·2c.c. ...	Do. VI	A.M.	7 1 91	DO. ...	5	...	12 1 91	...	7	...	V. N.	Dea	th.
III	,, ...	,, ...	0·2c.c. ...	Do.	A.M.	7 1 91	Do. ...	5	...	12 1 91	...	8	...	S.	Dea	th.
I	Guinea-pig ...	Pericardial fluid.	1·0c.c. ...	Do. LVI	P.M.	28 12 91	Do. ...	10	40·1 38·3	7 1 92	38·6	35	40·3 38·4	S.	2	39·4 38·6
... ...	,, ...	,, ...	1·0c.c. ...	Do.	P.M.	28 12 91	Do. ...	10	40·1 38·6	7 1 92	38·7	10	39·6 38·3	S.	2	39·4 38·5
I	,, ...	Cerebro-spinal fluid.	0·5c.c. ...	Do. XXXIV	P.M.	15 8 91	Do. ...	11	40·0 38·3	26 8 91	38·9	35	40·2 38·7	S.	7	40·5 39·4

I—*continued.*

ation, Maximum Temperatures, and the Maximum number of hæmatozoa present during the former.

II. Paroxysm.		II. Inter-mission.		III. Paroxysm.			III. Inter-mission.		IV. Paroxysm.			IV. Inter-mission.		V. Paroxysm.			V. Inter-mission.		VI. Paroxysm.			VI. Inter-mission.		VII. Paroxysm.			VII. Inter-mission.	
Maximum and Minimum Temperatures °C.	Maximum number of Hæmatozoa.	Length in days.	Maximum and Minimum Temperatnres°C.	Length in days.	Maximu m and Minimum Temperatures °C.	Maximum number of Hæmatozoa.	Length in days.	Maximum and Minimum Temperatures °C.	Length in days.	Maximum and Minimum Temperatures°C.	Maximum nnmber of Hæmatozoa.	Length in days.	Maximum and Minimum Temperatures°C.	Length in days.	Maximum and Minimum Temperatrues°C.	Maximum number of Hæmatozoa.	Length in days.	Maximum and Minimum Temperatures°C.	Length in days.	Maximum and Minimum Temperatures°C.	Maximum number of Hæmatozoa.	Length in days.	Maximum and Minimum Temperatnres°C.	Length in days.	Maximnm and Minimum Temperatures°C.	Maximum number of Hæmatozoa.	Length in days.	Maximum and Minimum Temperatures°C.
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39·0 39·0	F.	2	38·4 37·4	4	41·3 38·8	V. N.	1	38·3 38·2	6	41·0 37·8	V. N.	3	40·6 39·4	De	ath.	...	...	...	...	...	...	...	...	...	...	...	...	...
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40·2 38·6	F.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
41·2 39·0	S.	1	40·0 40·0	44	40·6 39·1	S.	2	40·0 39·7	6	40·7 39·8	F.	18	40·9 40·0	2	41·1 40·4	F,	23	41·1 39·1	2	39·3 35·0	N.	De	ath.	...	...	...	...	...
40·6 38·6	S.	4	39·9 39·5	3	40·6 39·4	N.	3	40·2 39·5	5	40·7 39·4	N.	2	40·4 39·7	3	40·8 40·0	F.	19	41·0 35·0	De	ath.	...	...	...	...	...	...	...	...
41·0 38·8	S.	De	ath.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
40·4 38·4	S.	3	39·7 39·0	7	40·1 39·0	V. N.	6	40·5 39·4	41	44·0 35·0	S.	De	ath.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
39·2 39·2	N.	2	39·3 39·0	9	39·5 37·8	S.	2	39·5 39·3	33	40·3 38·4	S.	De	ath.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
40·5 36·8	S.	1	39·8 39·7	17	40·9 39·4	V. N.	1	40·3 40·1	1	40·5 40·4	F.	5	40·3 39·6	2	40·5 40·0	F.	1	40·8 40·3	2	40·7 40·3	N.	2	41·3 40·0	3	41·5 40·7	F.	2	40·6 39·6
IX. 40·8 40·5	F.	1	40·6 40·3	2	X 40·5 40·2	F.	5	40·5 39·2	2	XI, 40·6 40·2	F.	1	40·3 40·1	8	XII. 40·6 39·2	S.	De	ath.	...	...	...	...	...	...	...	...	...	...
41·8 39·4	N.	De	ath.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
41·4 39·6	N.	1	40·6 40·6	1	41·3 40·3	F.	1	40·5 38·5	3	40·7 38·6	N.	De	ath.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
41·8 41·2	F.	9	42·0 40·3	1	41·2 40·6	F.	1	41·1 41·0	1	41·3 40·0	F.	2	41·5 40·1	2	41·2 40·3	F.	2	41·0 40·5	3	40·9 40·2	N.	1	40·1 39·9	2	40·7 39·6	F.	3	41·1 39·9
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41·8 41·5	F.	27	42·2 40·1	4	41·2 39·6	F.	2	41·0 39·5	2	40·3 38·9	F.	De	ath.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
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41·0 39·1	S.	1	40·4 39·8	3	40·7 40·0	N.	4	40·6 39·8	6	40·8 39·7	N.	1	40·3 40·2	13	40·9 39·7	V. N.	1	41·0 40·7	1	39·8 38·7	F.	1	39·0 38·5	1	37·3 37·1	N.	De	ath.
41·0 39·9	N.	1	40·5 40·1	15	40·8 39·6	N.	4	40·4 39·9	25	40·7 39·3	S.	2	40·1 40·1	9	40·7 39·9	N.	8	40·9 40·1	2	40·6 40·1	N.	1	40·3 40·1	5	40·5 37·1	F.	De	ath.
40·8 38·2	S.	2	40·4 40·0	12	40·6 39·6	N.	2	40·3 40·0	20	41·4 39·5	N.	1	40·6 39·6	3	40·5 39·3	N.	De	ath.	...	...	...	...	...	...	...	...	...	...
40·3 39·3	N.	3	40·6 39·5	3	40·7 40·1	F.	2	40·6 40·3	15	40·7 39·3	N.	2	40·6 39·8	5	40·3 39·3	F.	1	40·6 40·3	1	41·1 40·3	F.	2	41·1 40·4	2	41·4 40·2	N.	2	41·1 40·4
IX. 40·9 40·1	N.	1	40·8 40·7	2	X. 40·7 40·6	F.	1	40·5 40·0	2	XI. 40·7 40·1	N.	3	40·4 39·7	14	XII. 40·9 39·5	S,	1	40·8 40·7	3	XIII. 40·7 40·4	N.	3	40·9 40·3	1	XIV. 40·9 40·3	F.	1	40·3 39·4
XVI. 40·1 39·2	N.	1	39·7 39·4	2	XVII. 40·6 35·5	F.	De	ath.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
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39·4 39·0	N.	2	39·4 38·5	5	39·5 38·4	F.	1	39·2 38·5	2	39·3 38·1	N.	De	ath.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
40·6 38·2	S.	De	ath.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
41·1 40·4	N.	4	40·7 39·4	5	40·6 39·4	V. N.	De	ath.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

SECTION IX.

Complications of Surra.

A.—Diseases of the Respiratory Organs.

Pneumonia.—When present, the consolidation was localized or circumscribed. In the majority of cases one lung only was attacked, but it was not confined to any particular position, the apices, anterior inferior angles, bases and centre of the organs being the seat of the change; but in the latter position it was generally superficial, (*i.e.*) lying directly under, and for several inches below the pleura, which was also involved. It was observed in three out of eight cases of the naturally contracted disease, (cases Nos. II, X, LXXI); and in one out of two cases when the disease was transmitted by gastric injestion (case No. XXVI). But when transmitted by subcutaneous inoculation of ante and post mortem blood, with the former it was seen in three out of nineteen cases, and with the latter, in six out of fourteen cases.

Emphysema.—A localized emphysema, usually complicating the apices and the edges of the lungs, was present in nearly every case in horses, but in Guinea-pigs it was found frequently pervading the entire organ. In several instances, distended lobules lying immediately beneath the pleuræ were found to project in the form of blebs, as large as walnuts with very thin and almost transparent walls; whilst in one case the large bleb was filled with a clear but dark, amber-coloured fluid, but not containing red blood corpuscles.

A collapsed or atalectatic condition of the apices more particularly was not an infrequent complication.

Pleurisy is an occasional complication. It was noticed in three cases; adhesions were present in one, No. VIII, and with effusion in two, Nos. V, XI.

B.—Complications referable to the Organs of Circulation.

Sudden Collapse has been mentioned by Steele as a not unfrequent termination in Surra cases in mules. In two cases we have observed it, especially in Case No. LXXI; the animal fell dead, without any premonitary symptom or warning of any kind.

Palpitations and vehement action of the heart occur to a greater or less extent towards the termination of every case. The impulse of the heart is so forcible as to move the body of the animal when each beat occurs.

Pericarditis has not been observed as a complication of Surra.

Hæmorrhages.—Epistaxis has occurred in two animals, but the hæmorrhage on each occasion was only slight in amount.

C.—Complications referable to the Genital and Uterine Symptoms.

In mares serous effusion beneath the vulval mucous membrane is not infrequent; and as Steele observes "the irritation of these parts is, however, shown by frequent symptoms of 'Horsing'; indeed in mares there is almost always in this disease a little reddish brown fluid, dried about the external generative orifice, which discharge persists throughout the attack. The parallel to this sexual phenomenon of mares is seen in male animals, as frequent and quite uncalled-for erections of the penis, which may be due to irritation of the erection centre in the cord, but possibly also is associated with the formation of clots in the erectile structure of the penis, which organ latterly in the attack remains permanently slightly protruded and turgid, or there may be embolic plugging in the vessels."

Premature birth—Miscarriage.—In small animals such as rabbits and Guinea-pigs, pregnant females always miscarry within a short time after the appearance of the organism in the blood. If the female is near the full term of gestation when the organism makes its first appearance in the general circulation, the young may be born alive, and thrive as in the case of Guinea-pig No. III (pregnant doe).

D.—Complications referable to the Integuments and Joints.

Œdema of the extremities and under-surface of the abdomen. In horses which have come under our observation, œdema has been of exceedingly common occurrence, and appeared frequently as an early symptom. It first involved the fetlocks more especially of the hind limbs, and gradually extended upwards towards the hocks, the most noticeable features being the absence of heat and tenderness on pressure. In horses it was frequently accompanied by swelling and œdema of the sheath and scrotum and at a later date spread forward along the under-surface of the abdomen, finally invading the sternal region. In mares after the extremities had become involved, small patches of semi-solid œdema were observed, on one side or other of the chest, or between the fore legs. As long as an animal is able to assume the recumbent position, the exudation does not collect to any great extent, but as soon as the animal is condemned to the upright position for any length of time, these accumulations increase, and may attain to considerable proportions, as in the case of Horse No. XXI. Arsenic when administered in full doses for some days, appears to have a beneficial effect; the swelling and œdema gradually becomes less, and finally disappears completely.

Effusion into the Joints.—This is sometimes met with, but is not of common occurrence.

SECTION X.

DIAGNOSIS OF SURRA.

The demonstration of the '*Trypanosoma Evansi*' in equines will distinguish Surra from all other febrile diseases. As the periods of intermission in this disease vary in length from one to six days, so in order to positively exclude the possibility of any cases presenting dubious symptoms being those of Surra, it will be necessary to carefully examine microscopically the blood of the suspected animal daily for a period of ten days. If the result of the blood examination should prove negative during the above-mentioned period, the case may then be safely declared not to be one of 'Surra.' It must be borne in mind, however, that a cursory examination of one cover-glass preparation of fresh blood on each occasion will often prove insufficient, for it happens in the course of a case, that several days or occasionally a week may pass, during which period only one hæmatozoon may be discovered in two, or even three cover-glass preparations; this most frequently occurs at the commencement or termination of a long paroxysm, or in a case of chronic Surra.

SECTION XI.

PROGNOSIS AND MORTALITY.

Always fatal in the horse, mule and camel, but in the bovine species after a period, during which the animal suffers from fever, and the infusorian is present in varying numbers in the blood, the animal generally returns to a normal state of health.

TABLE XIII.

Showing the number of days which elapsed in seventy-six cases af naturally contracted Surra in horses, between the date of the first appearance of hæmatozoon in the blood, and death.

	Number of Days.	1 to 5.	6 to 10.	11 to 15.	16 to 20.	21 to 25.	26 to 30.	31 to 35.	36 to 40.	41 to 45.	46 to 50.	51 to 55.	56 to 60.	61 to 65.	66 to 70.	71 to 75.	76 to 80.	106 to 110.	Total number of Horses.
1888 ...	Bombay Tramway Company ...	3	...	1	2	...	3	...	...	1	...	1	...	...	...	...	...	...	11
	Bacteriological Laboratory ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1889 ...	Bombay Tramway Company .	1	1	7	8	1	6	6	3	1	5	2	1	2	...	1	...	...	45
	Bacteriological Laboratory ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1890 ...	Bombay Tramway Company ...	...	...	..	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	Bacteriological Laboratory ...	...	...	...	...	...	...	...	...	...	2	...	1	...	...	...	...	...	3
1891 ...	Bombay Tramway Company ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	Bacteriological Laboratory ...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	1
1892 ...	Bombay Tramway Company ...	...	...	1	2	...	1	1	2	2	1	...	...	1	1	...	...	1	13
	Bacteriological Laboratory ...	...	...	...	...	...	1	1	...	...	...	...	...	...	1	...	...	...	3
	Total ...	4	1	9	12	1	11	8	6	4	8	3	2	3	2	1	...	1	76
	Percentage ...	5·26	1·31	11·84	15·78	1·31	14·47	10·52	7·89	5·26	10·52	3·94	2·63	3·94	2·63	1·31	...	1·31	99·92

TABLE XIV

Showing the number of days which elapsed in thirty-five cases of inoculated Surra in horses, between the date of the first appearance of the hæmatozoon in the blood, and death.

	1 to 5.	6 to 10.	11 to 15.	16 to 20.	21 to 25.	26 to 30.	31 to 35.	36 to 40.	41 to 45.	46 to 50.	51 to 55.	Total.
Bacteriological Laboratory ...	9	2	4	5	2	5	2	2	3	...	1	35
Percentage ...	25·714	5·714	11·428	14·285	5·714	14·285	5·714	5·714	8·571	...	2·857	99·996

SECTION XII.

Pathological Anatomy.

The most important element in Surra is the presence of actively moving parasites in the blood. These were found by Evans in 1880, who thought at first the organism was a form of spirillum, but quickly became convinced to the contrary. Steele, in 1885, described and designated it the *Spirochæte Evansi.* In 1886, Crookshank made a more detailed inquiry into its life-history, and after recognizing that it was a flagellated Protozoon, called it *Trichomonas Evansi.* At a later date, 1887, Osler referred it to the new genus *Hæmatomonas,* described by Mitrapanow in 1883, to include the parasites of normal fish-blood, as "*Hæmatomonas Evansi.*" Balbiani, however, definitely considers it to be a Trypanosoma, and that it ought to be called Trypanosoma Evansi, and in this he is supported by Neumann. This flagellated infusorian is variously estimated as measuring from 20 to 50 micro-millimetres in length, by about 1 to 1·5 in breadth at its widest part. It presents a body, with two extremities, one being a short, sharp, somewhat rigid filament, the other long and slender, but gradually tapering with a beautiful undulating and diaphenous membrane, which extends from end to end, being best marked where the body is widest, and gradually becoming narrower and less distinct, finally merging into the two extremities.

A.—Generalities.

Emaciation.—The body is usually much emaciated, the word "Surra" implying "rot" or "dry rot"; and the disease is characterizedby a progressive loss of flesh, or withering of the tissues. In some cases, however, when the animal is carried off rapidly owing to the severity of the fever or from other causes, it may be in fairly good condition.

B.—Integuments, Muscles, and Bones.

1. *Jelly-like exudation.*—In the majority of cases there is found a varying amount of a gelatinous, light yellow, or greenish-coloured material, lying in the subcutaneous tissues; this may occasionally be present in very large quantities, especially in the neck, lying on either side of the trachea, in front of the sternum and along the most dependent part of the abdomen, also involving the sheath and the extremities. It is also frequently found between the muscles, and running along the sheath of the nerves; and in cases complicated with pneumonia, the individual lobules of the lung are divided off, or insulated by this jelly-like material.

2. *The Muscles.*—The muscles of the back, especially in long continued cases, are found to have undergone considerable atrophy. In the majority of cases they are of a very dark red colour, as if the animal had succumbed to asphyxia. When the case has been complicated by jaundice, all the tissues present a more or less yellow tinge.

3. *The Bones* and the white tissues of the body generally are tinged yellow in jaundiced cases.

C.—Organs of Digestion.

1. *The Pharynx and Œsophagus* rarely present any abnormal appearance, but if any are present in the latter, they are usually small wounds in the epithelium, due to the presence of the "*Spiroptera scutata.*"

2. *The Stomach.*—Some previous observers* have described the presence of ulcers in the stomachs of mules and horses, which have succumbed to this disease. Steele noted in the Burmah outbreak, that out of twelve cases certainly affected with Surra, nine had ulcers in the stomach; but at a later date, he found that animals of the same species, which died from other causes than 'Surra,' likewise presented the same pathological lesions. Evans states "that he examined with great care in every case in which he had an opportunity, the kidneys, liver, spleen, heart, lungs, and the mucous lining of the *stomach* and intestines throughout, and he is prepared to state positively, that this disease is not characterized by any structural organic change."

Again, Gunn remarks in his report on the post-mortems of three grass-cutters' ponies, which succumbed to Surra:—" The villous portion in these cases remained unaffected. In no case was ulceration to be seen, but the cuticular portion of the stomach was much thickened, and on the internal surface were observed numerous papillary eminences, each having a small and somewhat deep central depression."

In this investigation, in the majority of cases the cuticular portion of the stomach has practically been found free from grave complications.

In one case, No. I, the cuticular portion of the organ was described as thickened, but inexperience at that early period of the research probably led one to overlook the fact, that the coats were merely contracted. A partial yellow colouration of the lining membranes, either only involving the left sac, or in others staining both sides of the line of demarcation, was noted in one naturally acquired case of the disease (Horse No. II), and in five inoculated cases (Horses Nos. V, XX, XXX, XIX, XXXIV); and congestion of the cuticular portion was found once (Horse No. XXIV).

The villous portion or the right sac was much more frequently found to be the seat of marked changes.

Ulcers occurred in two cases, Horses XIX, XL, and were probably due to the effects of parasites. Congestion only in fourteen—three in naturally contracted cases (Horses Nos. I, III, LXV)- nine in inoculated animals from horse to horse (Nos. V, VII, XI, XV, XIX, XXI, XXII, XXXII), and two through the goat (Horses Nos. XL, XXXI).

Petechiæ in one naturally acquired (No. II), and in three inoculated (Nos. XI, XV, XXII). In one inoculated case extravasations of blood were present (No. VI), and small, round, elevated white patches in one naturally contracted case, viz. (No. LXXI). With regard to parasitical tumours, due to the presence of large numbers of the Spiroptera Megastoma, they were present in three naturally acquired cases (Nos. III, LVI, LXX), whilst in inoculated cases from horse to horse they were observed in XXIII, and from goat to horse, &c., in two (Nos. LX, L); and in case No. XXXIII, an extravasation of blood had occurred beneath the mucous and muscular coats.

3. *The Small Intestines.*—In a number of cases no pathological change of any kind is observable. On the other hand it is by no means infrequent to find the mucous membrane between the duodenum and the cæcum, more or less injected in patches, and ecchymoses dotted about either singly or in small groups. The solitary glands and Peyers's patches are never found enlarged or ulcerated, but the former present a pale colour, whilst in the latter, the slightly pigmented condition of health. In those cases we have examined the small number of entozoa present in the small intestines have been particularly noticeable, and especially has this been the case in Australians. Of the naturally acquired cases, two presented patches of congestion (Nos. II, LXV), and one (No. XL) in those horses inoculated from the goat.

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*Steele, Shaw, and Frost—(Burmah outbreak).

Ecchymoses were present in two naturally acquired (Nos. II, LVI), whilst, no less than nine inoculated animals (Nos. XIV, XV, VI, XXI, XXIV, LIX, LIV XX) also showed them.

The Mesenteric glands.—These were not enlarged as a rule, and presented abnormal appearances only in one case (No. III).

The Liver.—This organ is nearly always enlarged, especially so when death occurs during a paroxysm. In case No. XV it weighed nineteen pounds, seventeen and a half ounces. The anterior or convex surface as a rule presents circular patches, white or yellow in colour, when the membranes have been yellow during life, and these are due to thickening of the capsule. The surfaces of both lobes in nearly all the cases observed have shown signs of old perihepatitis; and in a large majority of country-bred animals examined, small, round or irregular masses of a hard, gritty consistency have been present on the surface of the organ, lying under the capsule and more or less invading the tissues; these are of parasitical origin.

Perihepatitis was present in the organs of all the naturally acquired Surra animals examined, and the hard concretions in (Nos. III, X, LXV, LXX); perihepatitis also was found in sixteen inoculated horses, and concretions in thirteen. The Pancreas is normal.

The Spleen.—This organ is always enlarged to a greater or less degree, and, in some instances has been found to assume abnormal proportions, especially in the case of an animal dying during a paroxysm, when the hæmatozoon has been swarming in the blood for some days. When, however, the animal succumbs, and the organism has been absent for some time, it may be found to be little, if at all, enlarged. The capsule is generally dotted over thickly with irregular-shaped ecchymoses of a brick-red colour, which are specially noticeable as they have a bluish white coloured or opalescent background.

The tissues as a rule, on section, are firm to the touch, and present a dark-red or purplish colour.

This organ was found to be enlarged in seven out of nine naturally acquired cases, and in all, petechiæ were present showing through the capsule. Of the inoculated cases, in nineteen the spleen was enlarged, and in eighteen out of twenty-eight the petechiæ were marked.

The Peritoneum.—Symptoms of old circumscribed inflammation are visible in most cases, as perihepatitis and occasionally perisplenitis, the organ being firmly attached to the stomach or to the parities, but we have in no single instance observed any signs of a general peritonitis.

D.—Organs of Circulation and Blood.

1. The cavity of the pericardium generally contains more or less fluid presenting an amber or orange colour, and in severe cases it is found deeply tinged with blood. Pericarditis has not been observed.

The Heart generally presents some abnormal appearance. The base is frequently the seat of a yellow or orange-coloured deposit of gelatinous exudation, which takes the place of the usual fat. This exudation in the great majority of cases is dotted over with small, circular ecchymoses, dark red or nearly purple in colour, which lie under the visceral pericardium singly or in groups, and sometimes assume the proportions of extravasations; these are also found, but less frequently invading the external surface of the muscular tissue of the organ, and a common situation for them also is on either side of the coronary vessels.

The right side of the heart is in most instances dilated, the left side contracted. The muscular tissue is often pale and flabby, and in a state of fatty degeneration.

The cavities of the right side of the heart, and much less frequently the left, are distended with clots, which present a variety of colours ranging from yellow or orange, to green and dark purple; these may be found bathed in dark semifluid blood. These coagula run up the great vessels from the cavities of the organ, and on gentle traction can be detached, and are found to reproduce the branching and peculiarities of the vessel, which they occupied. The lining membrane of the right auricle and ventricle, and much less frequently the cavities on the left side, are observed to be stained a dusky red or claret colour; but the pathological change, which gauges the gravity of the disease in each individual case, must be looked for and estimated by the number and extent of the sub-endocardial extravasations. These in cases under treatment, when the hæmatozoon has been absent for some ten days, have been found to be entirely absent; in other cases they may be represented by a few petechiæ, and again in more severe attacks, extensive extravasations of blood may be present. These sub-endocardial changes are usually more frequently present in the right ventricle than in the left, and have been noticed in the cavities on the right side of the heart, when they have been entirely absent from the left. They are least frequently found in the left auricle. A common situation for them to occupy is the surface of the musculi papillares, but they may appear on any portion of the muscular wall of the cavity, as well as frequently involving the inner surface of the flaps of the tricuspid and mitral valves. The ventricles occasionally present well marked signs of fatty degeneration, and although in the human being, the left is the more frequently affected, in these cases the right ventricle has been observed to present the most marked changes, near to the apex of the organ. In cases where the visible mucous membranes have been stained yellow during life, the same colouration of the tissues of the internal surface of the heart has been found well marked. In all the cases the yellow deposit of gelatinous material was present round the base of the organ.

Naturally contracted.—In four of these cases, ecchymoses or more extensive extravasations were found on the external surface, lying under the visceral pericardium (Nos. III, LXX, LXXI), and well marked in one (No. LVI). Sub-endocardial extravasations were present on the bicuspid valves in Nos. (LVI, LXX), and involving the tricuspid valve in No. LXX.

Inoculated cases:—In twelve cases, ecchymoses were present on the external surface of the heart, in (Nos. V, VI, XIV, XX, XXIV, XXX, XXXIII, XXXVIII, XLIV, L, LIV, LIX), and internal sub-endocardial extravasations as follows:—

In the right auricle, in two (Nos. LIX, XXXIII).

„ „ ventricle, in twelve (Nos. XIV, XV, VIII, XXII, XXIV, LIX, XX, XXXIII, XXXIV, XL, XXXI, L).

„ left auricle, in three (Nos. LV, XXXIII, XXXIV).

„ left ventricle in fourteen (Nos. XIV, XV, VIII, XXX, XXI, XXIV, LIV, LIX, XX, XXXIII, XXXIV, XLI, XL, XXXI).

The musculi papillares were involved in four cases (Nos. XIV, XV, XXI, LIV).

E.—Organs of Respiration.

The Larynx usually presents nothing abnormal.

The Trachea is sometimes the seat of congestion, as in case No. LXXI, and contains a quantity of frothy mucus.

The Bronchi are usually healthy, but occasionally present the signs of bronchitis, or contain purulent material when pneumonia is present.

The Pleuræ rarely present signs of inflammation (case No. VIII, however, showed signs of recent changes), but sometimes petechiæ are seen lying under the parietal pleura. The cavity of the pleuræ seldom contains any fluid, but in three cases (Nos. V, VIII, LIX) several ounces were found in each.

The Lungs.—The most common morbid appearances in Surra, according to frequency, are *emphysema* in nearly all *ecchymoses* lying under the visceral pleuræ, and a localized pneumonia is by no means uncommon; in one case (No. LXXI) broncho-pneumonia was present, but in all the other twelve (Nos. II, X, V, XXI, XXVI, XVIII, XIX, XXVII, XI, VII, XXXIII, XXXI) the lobules were surrounded by a gelatinous exudation, the change resembling pleuro-pneumonia of cattle. In a large majority of horses examined *post mortem*, the lungs presented calcareous bodies rather superficially situated, or in the depths of the tissues, exactly similar to those found in the liver. These, as in the former case, are due to some cestode, and the changes are of ancient date, considerably before the contraction or inoculation of Surra.

F.—Nervous System.

1. *The Cerebral Membranes* in the majority of cases present a normal appearance, but in several cases, increased injection has been noticed, and in one case (No. LXXI) the arachnoid presents signs of slight superficial extravasations.

2. An access of fluid in the lateral ventricles has been frequently met with. This fluid is colourless or slightly opalescent, and in cases where the membranes have been yellow during life, the fluid may be tinged.

The Brain and Cerebellum are pale, and the convolutions flattened when there is an excess of fluid in the lateral ventricles. The *iter a tertio*, &c., has been observed to be dilated, reminding one of the condition found *post mortem*, in children who have succumbed to ventricular meningitis.

Spinal Cord.—In some cases there is an increase in the amount of fluid within the spinal canal, and in others a quantity of gelatinous material in the lower dorsal and lumbar region surrounding the cord, and this may in part account for the priapism in horses, which occurs frequently in the course of the disease.

G.—Urinary System.

The Kidneys, Right—Congested (Nos. III, LVI).

„ „ —Petechiæ (Nos. X, XIV, XV, VI, XXX, XXI, LIX). The organs generally present a pale appearance, but not unfrequently one or both are the seat of numerous petechiæ (cases Nos. X, XIV, XV, VI, XXX, XXI, LIX), in some instances so small as to be only the size of a pin's head, but may be much more extensive. They are scattered over the external cortical surface of the organs, and on section are found to dip into and invade the tissues below.

The stellate veins are frequently injected, and occasionally the surface of the organ is the seat of congested patches, as in cases (Nos. III, LVI).

TABLES SHOWING THE PATHOLOGICAL CONDITIONS OF THE SEVERAL CASES UNDER INVESTIGATION.

Table

Showing the Pathological conditions

Number.	Tissues.	Body.	Swelling and Œdema.					Pleural Cavities.		Trachea.	Lungs.	
			Extremities.	Scrotum	Sheath	Under-surface of the Abdomen.	Chest.	Fluid.	Adhesions.		Right.	Left.
I ...	...	Emaciation...	A	A	A	A	A	A	A	......	Emphysema ...	Emphysema ...
II ..	...	Do. ...	A	A	A	A	P	A	A	......	Apex, Ant: and outer borders-Pneumonia. Sub-pleural ecchymoses.	Do. ...
III ...	...	Do. ...	A	A	A	A	A	A	A	......	Emphysema ...	Do. ...
X ...	...	Do. ...	A	A	A	A	P	A	A	......	Do. ...	Do. ...
LVI ...	...	Slight emaciation.	A	A	A	A	A	A	A	......	Do. ...	Do. ...
LXV ...	...	Do. ...	A	A	A	A	A	A	A	......	Do. No ecchymoses.	Do. No ecchymoses.
LXX ...	...	Do. ...	P	A	A	A	P	A	A	......	Apex.—Emphysema. Concretions.	Apex.—Emphysema. Concretions.
LXXI ...	...	Do. ...	P	A	A	A	P	A	A	Convex surface. A patch of congestion. 3″ × 1½″ between larynx and bifur: of bronchi.	Apex.—Emphysema. Anterior and inferior portions seat of broncho-pneumonia.	Apex.—Emphysema. Anterior and inferior portions seat of broncho-pneumonia.
LXXII ...	...	Do. ...	A	A	A	A	A	A	A	......	Apex.—Emphysema. Sub-pleural ecchymoses thickly dotted	Apex.—Emphysema. Ecchymoses thickly dotted.
LXXIII ...	Orange...	Do. ...	A	A	A	A	A	R. 3 ozs. L. 4 ozs.	A	......	Apex.—Emphysema. Lobules-Pneumonia and isolated by exudation. Calcareous nodules.	Emphysema. Few calcareous nodules.
LXXIV ...	...	Emaciation...	A	A	A	A	P	R. 20 ozs. L. 30 ozs.	P	......	Ecchymoses. Anterior portion-Pneumonia.	Ecchymoses. Anterior portion-Pneumonia.
LXXVI ...	...	Extreme emaciation.	A	A	A	A	A	A	A	......	Emphysema. Ecchymoses.	Ant: lobule—Emphysema. Inferior border—Pneumonia. Superior surface—Pneumonia, size of a Tangerene orange.
LXXVII ...	...	Slight emaciation.	A	A	A	A	A	A	A	......	Do. ...	Emphysema. Ecchymoses.
LXXVIII ...	...	Emaciation...	P	A	A	A	A	R. 60 ozs. L. 21 ozs.	P	......	Do. ...	Anterior one-half-Pneumonia. Ecchymoses.
LXXIX ...	Orange...	Do. ...	P	A	P	P	A	R. 40 ozs. L. 40 ozs.	A	Stained orange internally. Numerous patches of congestion.	Do. ...	Emphysema. Ecchymoses.
LXXX ..	...	Slight emaciation.	A	A	A	A	A	R. 20 ozs. L. 20 ozs.	A	......	Do. ...	Emphysema. Ecchymoses. Posterior ½ Pneumonia.
LXXXI ...	Orange...	Do. ...	A	A	A	A	A	R. 2 ozs. L. Nil.	A	......	Healthy	Anterior 6″ Pneumonia.
LXXXII ...	...	Emaciation...	A	A	A	A	A	R. 30 ozs. L. 30 ozs.	A	......	Emphysema. Ecchymoses.	Lobule- } Pneumonia. Base ... } Ecchymoses
LXXXIV ...	...	Well nourished.	P	A	A	P	P	A	A	......	Emphysema ...	Emphysema ...

dial	Heart.			Fluid in Peritoneal Cavity.	Liver.	
	Externally.	Internally.			Perihepatitis.	Concretions.
		Right.	Left.			
ss ...	Healthy	Healthy	Healthy	Few Ascaris megalocephala.	Hea	lthy.
...	Do.	Do.	Do.	Fluid absent.	P	A
ss ...	Do.	Do.	V—Walls hypertrophied.	A	P	P
quan-	Pale. No extravasations.	Large decolourized clot.	Contracted. Small clot.	A	P	P
ss ...	Extensive extravasations on ant: cor: vessel.	A. V. } Blood stained. No extravasations.	V—Numerous extravasations on mus. pap.	A	P Weight—	A 11 lbs. 3½ ozs
...	Free. 5 lbs. 15 ozs. ...	A—Small quantity of blood. No sub-endocardial petechiæ. V—Dark blood clots. No petechiæ.	A—Small quantity of dark blood. No petechiæ. V—Empty. contracted. No petechiæ.	A	P 12 lbs.	P 3½ ozs.
ces...	Base—Yellow exudation. Numerous petechiæ.	A—Few dark red clots. V—Some blood and clots.	A—Empty. V—Two dark sub-endocardial ecchymoses on mus. pap.	A	P	A
...	Base—Yellow exudation. Few small petechiæ.	A—Some dark clots. No sub-endocardial petechiæ. V—Dark clots. No sub-endocardial petechiæ.	A—Empty. V—Contracted. Dark clots. No sub-endocardial petechiæ.	A	P Enla 14	A rged lbs.
...	Base—Orange exudation. Sub-pericardial extravasations especially along coronary vessels.	A. V. } No sub-endocardial extravasation.	Healthy. V—Contracted. Several groups of extravasations on mus. pap.	A	Hea 13 lbs.	lthy. 12 ozs.
...	Somewhat small. Base yellow exudatiou. 5 lbs. 2 ozs.	Dilated, dark clots. No sub-endocardial extravasations.	Contracted. Few dark clots; no sub-endocardial extravasations.	6 ozs. blood-stained fluid.	P 9 lbs.	P 12 ozs.
...	Base, Ant: & post. cor. vessels. } Orange exudation. No sub-pericardial extravasations. 6 lbs. 5 ozs.	A—Dark clots. V— Do. Few sub-endocardial ecchymoses.	A—Empty. V—Contracted. Walls thickened. Few dark clots almost black with extravasations.	A	P	P
...	Somewhat contracted. Base, yellow exudation Few sub-pericardial ecchymoses. 7 lbs. 7½ ozs.	A. V. } Dark semi-solid clots. No sub-endocardial extravasations.	A. V. } Dark semi-solid clots. No sub-endocardial extravasations.	6 ozs.	P 11 lbs.	A 11½ ozs.
...	Enlarged. No exudation. No sub-pericardial ecchymoses. 6 lbs. ½ oz.	Dilated. A. V. } Dark fluid blood. Endocardial lining yellow. No sub-endocardial extravasations.	Contracted. A. V. } Empty. Endocardial lining, yellow. No sub-endocardial extravasations.	A	P 10 lbs.	A 4 ozs.
..	Base—Yellow exudation dotted with circular dark ecchymoses. Apex-Extravasations.	A. V. } Dark fluid blood. Chordæ Tendineæ. Few small dark clots.	A—Empty. V—Wall thickened. Numerous sub-endocardial extravasations, especially upper ½ and mus. pap.	A	P Internally 14 lbs.	A full of blood 7 ozs.
...	Very large. Base—orange exudation dotted over with few sub-pericardial extravasations. 8 lbs. 4½ ozs.	A—Few dark clots. V—Walls hypertrophied. Yellow blood clots. Upper portion. Few sub-endocardial extravasations.	V—Walls hypertrophied. Few blood clots mus. pap. and Chordæ Tendineæ. Upper portions large. Sub-endocardial extravasations.	A	P 14 lbs.	A 11 ozs.
...	Considerably hypertrophied. No exudation, R. V. numerous sub-pericardial ecchymoses. 7 lbs.	A—Dark clot. Few sub-endocardial extravasations. V—Large dark circular extravasations on its wall.	V—Lining membrane yellow. Ecchymoses. Mus. pap. Several extravasations.	2 ozs. clear fluid.	P 12 lbs. Few sub- petec	P 8 ozs. capsular hiæ.
ess ...	Base.—Seat of fat. No ecchymoses.	A—Some fluid blood. Endocardial lining, orange. No sub-endocardial extravasations. V— Do. do.	A—Some fluid blood. Endocardial lining, orange. No sub-endocardial extravasations. V— Do. do.	A	P 11 lbs.	P 7 ozs.
...	R. A.—Numerous small dark-red petechiæ. 5 lbs. 10 ozs.	V—Few small sub-endocardial extravasations.	Healthy	40 ozs. blood-stained fluid.	P 7 lbs.	A 6 ozs.
...	Enlarged. No petechiæ. 6 lbs. ¾ oz.	A. V. } Blood clots. Internal linings, blood-stained. No extravasations.	A—Empty. V— Do. Contracted. Few sub-endocardial extravasations, especially on mus. pap.	A	P 9 lbs.	A 12½ ozs.

Spleen.	KIDNEYS.		STOMACH.	
	Right.	Left.	Cuticular portion.	Villous porti
Somewhat soft	Somewhat soft	Somewhat soft	Thickened	Congested and ec ed.
Enlarged and petechiated.	Healthy	Healthy	Yellow	Few petechiæ
Enlarged. Petechiæ dotted over.	An oval red patch ½″×¼″. Capsules adherent.	Do.	Healthy	3 Spiroptera M tumours. Small congestion in curvature.
Enlarged. Small petechiæ.	Cortical surface, two petechiæ.	Healty	Do.	Healthy ...
Enlarged. Conv. surface white cicatrix. 3 lbs. 13 ozs.	Capsule slightly adherent. Surface granular. Post. Stell. veins congested 1 lb. 11 ozs.	Pale. No sub-capsular petechiæ. 1 lb. 10 ozs.	Do.	1 Spiroptera tu
Small, firm, no blood. 2 lbs. 5 ozs.	Superficial veins distended. No petechiæ. Cortical portion, vertical striation. Med. portion pale. 1 lb. 12½ ozs.	Superficial veins distended. No petechiæ. Cortical portion, vertical striation. Med. portion pale. 1 lb. 11 ozs.	Do.	Pale. Small diameter, pale colour due congestion.
Enlarged, firm. No ecchymoses. 3 lbs. 4 ozs.	Healthy. 1 lb. 10½ ozs. ...	Healthy. 1 lb. 10½ ozs.	Do.	1 Spiroptera t 4″×2″×1″.
Sub-capsular petechiæ ...	Healthy	Healthy	Do.	Mucous membr ened. Several raised patches ceration.
Enlarged to 1½ normal size. Few sub-capsular petechiæ. Tissues dark and semi-solid, 3 lbs. 1 oz.	Small dark sub-capsular extravasations. 1 lb. 11 ozs.	Small dark sub-capsular extravasations. 1 lb. 9 ozs.	Narrow band 2″ wide, seat of yellow deposit.	4 Spiroptera the size of wal
Yellowish-white. Few petechiæ dotted, 1 lb. 1¼ ozs.	Healthy ... ... 1 lb. 10 ozs.	Healthy ... ... 1 lb. 7 ozs.	Healthy	Small circular S tumour at the
Healthy	Enlarged. Stellate veins injected. 1 lb. 12 ozs.	Enlarged. Stellate veins injected. 2 lbs. 1½ ozs.	Do.	2 large Spiro mours.
Sub-capsular petechiæ. 1 lb. 9½ ozs.	Enlarged. Cortical surface—Numerous violet petechiæ. 2 lbs. 8½ ozs.	Enlarged. Cortical surface—Numerous violet petechiæ. 2 lbs. 9 ozs.	Do. ... ... Orange material on either side of line of demarcation.	1 Spiroptera the fundus a left wall.
Double normal size. Few dark red sub-capsular extravasations. Internally,—Tissues resemble amyloid change. 3 lbs. 8½ ozs.	Healthy ... ... 1 lb. 5½ ozs.	Healthy ... ... 1 lb. 3 ozs.	Walls thickened. Internally-Lobulated appearance.	Greenish-yello nally—Deeply ed. 1 Spi mor.
Small. Numerous sub-capsular petechiæ. 1 lb. 9½ oz.	Stellate veins injected. No petechiæ. Cortical portion congested. 1 lb. 8½ ozs.	Stellate veins injected. No petechiæ. Cortical portion—congested. 1 lb. 9½ ozs.	Healthy	1 Spiroptera t
Few dark purple petechiæ 2 lbs. ¾ ozs.	Yellow. Numerous sub-capsular petechiæ. 1 lb. 14¼ ozs.	Yellow. Numerous sub-capsular petechiæ. 2 lbs. 3 ozs.	Do.	1 Spiroptera mucous mem
Numerous sub-capsular petechiæ.	Minute petechiæ. Cortical portion—Numerous small petechiæ 2 lbs. 5 ozs.	Minute petechiæ, Cortical portion—Numerous small petechiæ. 2 lbs. 1 oz.	Do.	Pale green nally, red dotted.
Greatly enlarged. Few sub-capsular petechiæ. 4 lbs.	Veins injected 1 lb. 7 ozs. Malpighian corpuscles visible as red points.	Veins injected. 1 lb. 3ozs.	Do.	Congested a demarcation roptera tum ceration.
Numerous small sub-capsular petechiæ. 1 lb. 15½ ozs.	Healthy ... ... 1 lb. 8½ ozs.	Healthy ... ... 1 lb. 8½ ozs.	Do.	One Spiropt the size of w fundus.
Enlarged. Numerous sub-capsular petechiæ. 2 lbs. 6 ozs.	Healthy ... ... 1 lb. 8 ozs.	Healthy ... ... 1 lb. 6½ ozs.	Do.	Yellow. Mu hrane healt roptera tum

several cases under investigation.

l Intestines.	Large Intestines.				Bladder.	Brain.	Remarks.
	Cæcum.	Colon.	Rectum.	Parasites.			
congested and nosed patches.	Several	congested and ecch	ymosed patches Asc.	Meg.	Healthy	Healthy	Schneiderian membrane thickened and congested.
... ...	Healthy	Healthy	Healthy	A ...	Do.	Do.	Yellow exudation under the skin in the sternal region .
... ...	Do.	Do.	Do.	Sp: Megast. ...	Do.	Do.	Both corneæ opaque. Mesentric glands considerably enlarged.
... ...	Do.	Do.	Do.	A ...	Do.	Do.	Some yellow exudation between the pericardium and sternum.
cchymoses dot- No ulceration.	Do.	Do.	Do.	Spiroptera Megast.	Do.	Do.	Numerous petechiæ on conjunctival membranes which are yellow. Mucous membranes yellow.
ly—walls coated nucus. 5 patches ravasation.	Do.	Do.	Do	A ...	1·5 litres orange urine Sp. Gr. 1,020, alkaline, no albumen.	Superficial veins congested. Cerebro-spinal fluid 75c.c.	Conjunctivæ petechiated.
coated with material.	Few circumscribed patches of congestion. No ulceration.	Few circumscribed patches of congestion. No ulceration.	3 circumscribed patches of congestion. No ulceration.	Sp. Megast. Few str : armat : in large Intestines.	Healthy	Healthy	
... ...	Healthy	Healthy	Healthy	16 St. armat : ...	Do.	Some congested patches.	Nasal fossæ,—Mucous membrane black. Small quantity of gelatinous material over sternal region.
membrane be- pylorus and cal valve con- l. No ulceration.	Semi-fluid fæces containing nematodes. Mucous membrane slightly congested.	Upper part semi-fluid fæces containing nematodes.	Do.	Few st. armat : ...	Some litres urine. Sp. Gr. 1,030, alkaline. Fundus Hæmor : patch 2″ square.	½ oz. fluid in lateral ventricles.	
y	Healthy	Healthy	Do.	Sp: Megast. 2 str. armat. in cæcum.	Contracted	Healthy	
... ...	Congested patch 3″ square. No ulceration.	Do.	Oval ulcer with thickened edges. Co-agulated pus on surface.	Sp: Megast. ...	Several pints urine. Sp. Gr. 1,028, acid, mucous membrane petechiated.	Do.	Nasal fossæ—Schneiderian membrane somewhat congested.
l small patches ngestion. Peyer's es œdematous. ceration.	Vessels injected over space 4″×3″.	Do.	Healthy	Do. ...	Urine—orange, Sp. Gr. 1,013, acid, mucous membrane petechiated.	Do.	Complete absence of subcutaneous adipose tissue.
ed. A patch of vasation 2″×1·5″ um. Peyer's es swollen and atous. No ul- ion.	Deeply congested patch 5″×4·5″. No ulceration.	Do.	Do.	Do. ...	Healthy	Superficial veins congested.	
y	Healthy	Do.	Do.	Do. ...	Do.	Healthy	
ongested patches lceration.	Do.	Large congested patches on mucous membrane. No ulceration.	Few petechiæ. No ulceration.	Do. ...	Empty. Vessels injected. A patch of extravasation at the fundus.	Do.	
chiæ at the com- ement of the duo- m.	Do.	Healthy	Healthy	A ...	Healthy	Do.	
y stained orange.	Do.	Do.	Do.	A ...	Do.	Do.	
y	Do.	Do.	Do.	Spiroptera Megast.	22 ozs. blood-stained urine, Sp. Gr. 1,034.	Do.	
. ...	Do.	Do.	Do.	A ..	Healthy	Do.	

TABLE

Showing the Pathological Conditions

	Number.	Tissues.	Body.	SWELLING AND ŒDEMA.					PLEURAL CAVITIES.		Trachea.	LUNGS.	
				Extremities.	Scrotum.	Sheath.	Undersurface of the Abdomen.	Chest.	Fluid.	Adhesions.		Right.	Left.
Appendix II.	XX ...	...	Emaciation ...	P	A	A	A	A	A	A	......	Emphysema. concretions.	Emphysema. Concretions.
	XXVI ...	...	Slight emaciation.	A	A	A	A	A	A	A	......	Apex-Emphysema. Emphy: blebs, the size of walnuts and filled with blood-stained serum. Lobules divided off by yellow exudation. Pneumonia 5″ × 5″	Apex-Emphysema. Emphy: blebs, size of walnuts and filled with blood-stained serum. Lobules divided off by yellow exudation.
Appendix III.	XIV ...	...	Slight emaciation.	P	A	P	P	A	A	A	Considerable amount of yellow material on either side.	Emphysema. Ecchymoses. Few concretions.	Emphysema. Ecchymoses. Few concretions.
	XV ...	...	Fairly well nourished.	A	P	P	P	A	A	A	......	Emphysema. Few ecchymoses. Concretions.	Emphysema. Few ecchymoses. Concretions.
Appendix IV.	V ...	...	Emaciation ...	A	P	P	P	A	R. } Small L. } quantity.	A	......	Apex and posterior lobe, pneumonia. Ecchymoses.	Free ... ...
	VIII ...	...	Do. ...	A	A	A	A	A	Do. ...	L.—Present...	......	Few concretions ...	Few concretions ...
	VI ...	...	Slight emaciation.	P	A	A	P	A	A	A	Swelling at the seat of Iodine injections.	Emphysema. Ecchymoses. Muco-purulent fluid on section.	Emphysema. Ecchymoses. Muco-purulent fluid on section
	XXII ...	...	Do. ...	A	A	A	A	A	A	A	......	Ecchymoses.	Ecchymoses ... ...
	IV ...												Decompo
	XXX ...	...	Fairly well nourished.	A	A	A	A	A	A	A	......	Emphysema. Ecchymoses.	Emphysema. Ecchymoses.
	XXI ...	Yellow ...	Considerable emaciation.	P	P	A	P	A	A	A	......	Emphysema. Concretions.	Emphysema. Concretions.
	XXIX ...												Decompo
	LXIV ...	...	Emaciation ...	P	A	A	A	A	A	A	......	Emphysema	Emphysema ... ...
	LIX ...	...	Do. ...	P	P	P	P	P	R. 20 ozs. L. 20 ozs.	A	......	Ecchymoses	Ecchymoses ... ...
	LIV ...	...	Slight emaciation.	P	A	A	P	A	A	A	......	Do.	Do. ... ...
	LV ...	...	Emaciation ...	P	A	A	A	A	A	A	......	Free	Nodules ... ...
	XXIV ...	...	Considerable emaciation.	A	A	A	A	A	A	A	......	Emphysema. Ecchymoses.	Emphysema. Ecchymoses.

dial .	Heart.			Fluid in Peritoneal Cavity.	Liver.	
	Externally.	Internally.			Perihepatitis.	Concretions.
		Right.	Left.			
...	One extravasation on right ventricle. Weight 6 lbs.	A.—Endocardial lining free. V.—Several small ecchymoses under endocardial lining.	A.—Endocardial lining free. V.—Several small ecchymoses under endocardial lining.	Fluid absent.	P Weight—	A 12 lbs. 5 ozs.
...	Healthy. 4 lbs. ...	A. } Full of semi-fluid V. } blood. No sub-endocardial ecchymoses.	A. } Full of semi-fluid V. } blood. No sub-endocardial ecchymoses.	A	P 8 lbs.	P 11 ozs.
...	Numerous extravasations anteriorly and posteriorly.	A.—Decolourized clots. V.—Few sub-endocardial extravasations. Walls hypertrophied.	A.—Decolourized clots. V.—Many large extravasations on mus : pap : . Walls hypertrophied.	A	P Lar	P ge
nces	Numerous purple extravasations, largest on anterior surface of R. V. Numerous pete : over base.	Distended by yellow clot. V.—Walls slightly hypertrophied. Few sub-endocardial ecchymoses.	A. } Distended by V. } clots. Numerous and extensive extravasations on mus : pap : .	Several pints.	P 19	P lbs.
in-	Base—Exudation ...	A. } Some clots. V. } No sub-endocardial extravasations.	A.—Few small clots. No ecchymoses. V.—Exceedingly contracted. Some blood clots. Walls hypertrophied.	A	P	A
...	Free	Black clots. Blood serum. V.—Sub-endocardial extravasations round upper part.	A.—Healthy. V.—Walls hypertrophied. Decolourized clot. Large sub-endocardial extravasations.	Small quantity.	P Much e 17½	P nlarged. lbs.
...	Base—Numerous minute petechial and larger extravasations.	A. } Dark clots. V. } No sub-endocardial extravasations.	A.—Empty. V.—Contracted. No extravasations.	A	P Enla	P rged.
es ...	Pale	A. } Distended with V. } clot and blood. No sub-endocardial ecchymoses.	A.—Dark clot. Very little fluid blood. V.— Do. Walls somewhat hypertrophied.	A	P 11 lbs.	P 10 ozs.
...	Base—Yellow Exudation. Several sub-pericardial ecchymoses.	A. } Semi-solid clot V. } bathed in blood. Numerous sub-endo : extrav : dotted over the walls of V. but very few in A.	A—Some semi-solid clots. V—Larger solid clot. Wall hypertrophied. Numerous small sub-endo : ecchymoses.	A	Small, un decom	dergoing position.
...	Large. Exudation under visceral pericardium.	Flaccid, few small clots. A. } No ecchymoses. V. }	Contracted. Walls hypertrophied. V—Decolourized clot. Two circumscribed patches of extrav : involving Auriculo-Ventricular valve.	A	P	P
...	Base—Yellow gelat : exudation dotted over with few petechiæ. Muscular tissue free. 5 lbs. 3 ozs.	Healthy	A—Healthy. V—Few sub-endocardial ecchymoses, some on the base of mus : pap.	A	P	P
es ...	Base—Orange exudation, R. V. Numerous sub-pericardial ecchymoses. 4 lbs. 7 ozs.	A—Few sub-endocardial ecchymoses. V—Numerous clots.	A—Healthy. V—Contracted. Few extravasations.	A	P 12 lbs.	P 11 ozs.
...	Base—Yellow exudation. Many extravasations. 4 lbs. 15 ozs.	Healthy	V—Sub-endocardial extravasations $\frac{3}{4}'' \times \frac{1}{2}''$ on musculi papillares.	A	A 13 lbs.	A 11 ozs.
nces	Base—Yellow exudation. Tissues pallid. No extravasations. 5 lbs. 10 ozs.	A—Healthy. V—Slight thickening of endocardial lining.	A—Few dark sub-endocardial petechiæ. V—Endocardium slightly thickened. No extravasations.	A	A 12 lbs.	A 5 ozs.
ma- pre-	Base—Yellow exudation, muscular walls. Few ecchymoses.	A—Blood clots. No sub-endocardial extravasation. V—Dark clot bathed in blood. Few sub-endo : petechiæ.	A—Blood clot. V—Contracted. Small clot. Walls hypertrophied. Fatty change. Few sub-endo : extravasations.	A	P Enla	P rged.

Spleen.	Kidneys.		Stomach.	
	Right.	Left.	Cuticular portion.	Villous portio
Few extravasations. Weight 2 lbs. 1 oz.	Somewhat pale. No petechiæ. 1 lb. 7 ozs.	Somewhat pale. No petechiæ. 1 lb. 7½ ozs.	Contracted, wrinkled and perfectly white.	Contracted. M membrane throw rugæ.
Small ... ... 1 lb. 8 ozs.	Healthy ... ... 1 lb. 5 ozs.	Healthy ... ... 1 lb. 4 ozs.	Healthy	Healthy.
Enlarged. Few extravasations. 3 lbs. 1½ ozs. ...	Stellate veins injected. Cortical surface—Many small petechiæ.	Stellate veins injected. Cortical surface—Many small petechiæ.	Healthy	Healthy.
Irregular shaped. No petechiæ. Flakes of lymph. 4 lbs. 7½ ozs.	Pale. Minute petechiæ. Stellate veins injected.	Pale. Minute petechiæ. Stellate veins injected.	A colony of bots 3" square.	A purple extrav surrounded by ecchymoses.
Healthy	Healthy	Healthy	Healthy	Mucous membran congested. Dem patches.
			Line of demarcation.—Yellow.	
Few petechiæ. Omentum—Two enlarged glands.	Pale	Pale	Healthy	Mucous membran ened.
Enlarged. Raised petechiæ. Superior border-lymph.	Capsule adherent. Small red petechiæ dotted over cortical portion.	Capsule adherent. Small red petechiæ dotted over cortical portion.	Do.	Mucous membra sents several s travasations. T pyloric auricles ed.
Few sub-capsular ecchymoses at pointed extremity. 2 lbs. 8 ozs.	Pale	Pale	Large collection of æstridæ.	Mucous membran ened. Surface material. Red dotted.
			Line of demarcation—orange.	
Somewhat soft. Dark-red ecchymoses. 3 lbs. 2 ozs.	Cortical portion. Numerous sub-capsule petechiæ. Stellate veins injected. 1 lb. 5 ozs.	Cortical portion. Numerous sub-capsular petechiæ. Stellate veins injected. 1 lb. 5 ozs.	Yellow	Yellow.
			Well marked at the line of demarcatio	
Several cicatricies on surface. No ecchymoses.	Large and pale. Several small purple petechiæ.	Large and pale. Several small purple petechiæ.	Mucous membrane thickened. No ulceration.	Dark-plum-colou No ulceration.
Enlarged. Numerous sub-capsular petechiæ. 2 lbs. 8 ozs.	Healthy. 1 lb. 2½ ozs. ...	Healthy. 1 lb. 1 oz. ...	Healthy	1 Spiroptera tu
Numerous petechiæ. 4 lbs. 2 ozs.	Pale. Few petechiæ. 1 lb. 10 ozs.	Pale. Few petechiæ. 1 lb. 10½ ozs.	Do.	Healthy.
Convex surface-Small petechiæ. 2 lbs. 8½ ozs.	Healthy. 1 lb. 7 ozs. ...	Healthy. 1 lb. 8 ozs. ...	Do.	Do.
Few petechiæ dotted. 2 lbs. 10 ozs.	Healthy. 1 lb. 2 ozs. ...	Healthy. 1 lb. 2½ ozs. ...	Do.	Do.
Somewhat enlarged. Convex surface. Few petechiæ. 3 lbs. 9 ozs.	Pale. Imbedded in yellow exudation. Stellate veins injected. 1 lb. 9 ozs.	Pale. Imbedded in yellow exudation. Stellate veins injected. 1 lb. 13½ ozs.	Do.	A patch of co No ulceration.

the several cases under investigation.

mall Intestines.	Large Intestines.				Bladder.	Brain.	Remarks.
	Cæcum.	Colon.	Rectum.	Parasites.			
n-coloured viscid terial on mucous mbrane, 3 red petechiæ. No ulceration.	Healthy	Healthy	Healthy	A	Healthy	Healthy.	
thy	Do.	Do.	Do.	A	Do.	Do.	
petechiæ dotted. ulceration.	Healthy	Healthy	Healthy	A	Healthy	Healthy.	
patches of ecchyoses on mucous mbrane. No ulceration.	Do.	Do.	Do.	Bots	Do.	Do.	
thy	Healthy	Healthy	Healthy	A	Some congestion at the neck.	Healthy.	
.	Do.	Do.	Do.	A	Healthy	Do.	
circular ecchyoses. No ulceration.	Do.	Do.	Do.	A	Do.	Do.	
thy .	Do.	Do.	Do.	Bots	Do.	Do.	Atrophy of the glutei muscles.
thy	Do.	Do.	Do.	A	Do.	Do.	
patches of ecchyoses. No ulceration. n.	Do.	Do.	Do.	A	Do.	Do.	
lthy	Do.	Do.	Do.	Sp. Megast.	Do.	Do.	
.	Do.	Do.	Do.	A	Do.	Do.	
rnally-round petechiæ dotted. Few tches of congestion. ulceration.	Do.	Do.	Do.	A	Do.	Do.	
lthy	Do.	Do.	Do.	A	Do.	Do.	
.	Do.	Do.	Do.	A	Do.	Superficial veins distended with dark blood. Brain tissue dotted with pete: at: V. distended with cere: Spinal fluid.	Nasal fossæ mucous membrane intensely congested. No ulceration.

TABLE

Showing the Pathological conditions

	Number.	Tissues.	Body.	SWELLING AND ŒDEMA.					PLEURAL CAVITIES.		Trachea.	LUNGS.	
				Extremities.	Scrotum	Sheath.	Under-surface of the Abdomen.	Chest.	Fluid.	Adhesions.		Right.	Left.
Appendix V.	XVIII ...	...	Slight emaciation.	P	P	P	P	P	A	A	......	Emphysema	Emphysema ... ...
	XIX ..	...	Do. ...	A	P	P	P	P	A	A	......	Reticulated structure.	Apex.—Emphysema. Base.—Reticulated structure.
	XXVII ...	...	Do. ...	A	A	A	A	A	A	A	......	Ecchymoses	Ecchymoses ... ...
	XXIII ...	...	Considerable emaciation.	A	P	P	P	A	A	A	......	Apex ... } Emphysema. Free border. } Few ecchymoses ...	Apex ... } Emphysema. Free border. } Few ecchymoses ...
	XI ...	...	Do. ...	A	A	A	A	A	R. 20 ozs. L. Nil.	A	......	Apex.—Emphysema. Superior surface—Ecchymoses. Posterior—Few concretions.	Apex.—Emphysema. Superior surface—Ecchymoses. Posterior—Few concretions.
	XXXII ...	...	Well nourished.	A	A	A	A	A	A	A	......	Ecchymoses	Ecchymoses ... ...
	VII ...	...	Emaciation...	A	A	A	P	P	A	A	......	Ecchymoses. Sub-pleural exudation. Thrombi in small veins.	Base.—Pneumonia ...
Appendix VI.	XXXIII ...	...	Slight emaciation.	A	P	P	P	A	A	A	......	Apex.—Emphysema. Concretions.	Apex.—Emphysema. Few concretions, Base—Pneumonia.
	XXXIV ...	...	Fairly well nourished.	A	A	A	A	A	A	A	......	Apex.—Emphysema. Ecchymoses dotted.	Apex.—Emphysema, Ecchymoses dotted. Ante: lobe—Superior surface—Two concretions.
	XXXVIII ...	Yellow ...	Slight emaciation.	P	A	A	P	A	A	A	......	Small. Apex.—Emphysema. Concretions.	Small. Apex.—Emphysema. Concretions.
	XLI ...	...	Emaciation...	A	A	A	A	A	A	A	......	Ecchymoses dotted...	Ecchymoses dotted...
	XL ...	...	Fairly well nourished.	A	A	A	A	A	A	A	......	Apex, Inferior edges } Emphysema. Ecchymoses dotted over. Concretions.	Apex, Inferior edges } Emphysema. Ecchymoses dotted over. Concretions.
	XXXI ...	...	Emaciation...	P	A	A	A	A	A	A	......	Apex.—Ecchymoses.	Apex.—Ecchymoses. Ante. lobe—Pneumonia.
	L ...	...	Slight emaciation.	P	A	A	P	A	A	A	......	Free	The seat of hypostatic congestion.
Appendix VII.	Donkey No. 1.	...	Fairly nourished.	A	A	A	A	A	A	A	......	Few sub-pleural extravasations.	Numerous sub-pleural extravasations.
	Bull--Guinea Pig No. I.	...	Emaciation...	A	A	A	A	A	A	A	......	Apex.—Emphysema, Post. $\frac{2}{3}$ of the ant. lobes.—Pneumonia.	Apex.—Emphysema.
	Guinea Pig No. II.	...	Do. ...	A	A	A	A	A	Full of pus flakes of	with some lymph.	......	Anterior half of anterior lobe. Pneumonia.	Anterior half of anterior lobe. Pneumonia.
	Guinea Pig No. III.	...	Do. ...	A	A	A	A	A	A	A	......	Apex.—Emphysema.	Apex.—Emphysema.
	Guinea Pig No. IV.	...	Do. ...	A	A	A	A	A	A	A	......	Do. ...	Do. ...
	Sheep ...	...	Somewhat emaciated.	A	A	A	A	A	A	A	Considerable quantity of a white frothy fluid.	Inferior border of the anterior lobe.—Emphysema.	Inferior border of the anterior lobe.—Emphysema.

ricardial Fluid.	Heart.			Fluid in Peritoneal Cavity.	Liver.	
	Externally.	Internally.			Perihepatitis.	Concretions.
		Right.	Left.			
xcess ...	Yellow exudation. Posteriorly——Several groups of sub-pericardial ecchymoses.	A. } Pale. Numerous V. } large yellow clots.	A—Pale. V—Several sub-endocardial extravasations upon musculi-papillaris. Walls hypertrophied.	A	P	P
zs. ...	Dilated and hypertrophied. Few sub-pericardial petechiæ.	A—Few clots. No ecchymoses. V—Decolourized clot and dark blood. No ecchymoses.	A—Healthy. V—Contracted. Walls thickened. Musculi papillaris. Few petechiæ.	A	P	P
drachms.	Healthy. 5 lbs. 10 ozs.	A—Healthy. V—Few sub-endocardial extravasations.	A—Healthy. V—Few sub-endocardial extravasations.	A	P 12 lbs.	P 7 ozs.
excess ...	Large. Base-yellow exudation dotted with few petechiæ.	Dark red clots floating in blood.	A—Dark clot. V— Do. numerous sub-endocardial extravasations especially on musculi-papillares.	A	P	A
Do. ...	Large. Few sub-pericardial extravasations	A—Collapsed. V— Do. Wall hypertrophied.	V—Contracted. Walls thickened. Numerous large extravasations especially on musculi-papillares.	A	P	A
Do. ...	Numerous sub-pericardial petechiæ. 4 lbs. 7 ozs.	Distended. A—Dark clots. Few sub-endocardial petechiæ. V—Dark clots. Very numerous sub-endocardial extravasations.	Contracted. A—Little blood. V—Walls hypertrophied, little clot. Numerous extravasations.	A	P	P
zs. ...	Healthy	V—Numerous sub-endocardial extravasations especially on upper half and musculi-papillaris.	A—Patches of atheroma. V.—Hypertrophied. Few extrav: Considerable calcareous deposit under endocardium. Upper ⅔rd seat of numerous extravasations.	A	P	P
all quantity.	Base—Yellow exudation and muscular surface dotted with petechiæ. 4 lbs. 14 ozs.	A—Few sub-endocardial extravasations. V— Do.	A—Sub-endocardial extravasations. V—Numerous large extravasations especially on musculi papillares.	A	P 11 lbs.	P 2 ozs.
excess ...	Base—Yellow exudation. Several patches of extravasations. 7 lbs. 10 ozs.	A—Healthy ... ... V—Pale. Sub-endocardial petechiæ, walls hypertophied.	A—Few petechiæ ... V—Walls hypertrophied. Large sub-endocardial extravasations.	A	P 9 lbs.	P 14 ozs.
zs. ...	Extensive extravasations.	A—Numerous petechiæ dotted. Few clots. V—Full of clots. No sub-endocardial extravasations.	A—Numerous petechiæ dotted. Few clots. V—Few clots. No sub-endocardial extravasations.	A	P 9 lbs.	A 15 ozs.
excess ...	No ecchymoses ...	Healthy	V—Few sub-endocardial extravasations.	A	A	A
all quantity.	Base—Orange exudation. R. S.—Dilated. L.S.—Contracted. No eccymoses. 5 lbs. 7 ozs.	A—Dark clot ... ... V—Dark blood. Few sub-endocardial petechiæ.	A—Few blood clots. V—Large yellow clot bathed in blood. Numerous sub-endocardial extravasations on muscular papillares.	1 gallon.	P 13 lbs.	P 1½ ozs.
excess ...	Enlarged. Hypertrophied 6 lbs. 13 ozs.	A—Yellow clot ... V— Do. Numerous and extensive sub-endocardial extravasation.	A—Yellow clot. V— Do. Numerous and extensive sub-endocardial extravasations.	A	P	P
Do. ...	Yellow exudation. Few ecchymoses. 5 lbs. 12 ozs.	A—Full of clots. No ecchymoses. V—Full of dark clots. Numerous large sub-endo: extravasation especially on mus: pap:	A—Full of dark clots. No ecchymoses. V— Do.	A	P Enormously 22 lbs.	P enlarged. 2½ ozs.
Do. ...	Healthy ... 1 lb. 3½ ozs.	A—Blood stained. No sub-endo: extravasations.	Healthy	A	Numerous capsular 3 lbs.	minute sub-petechiæ 8 ozs.
Do. ...	Healthy ...	Healthy	Do.	A	A	A
Do. ...	Do. ...	Do.	Do.	A	A	A
Do. ...	Do. ...	Do.	Do.	A	P Enla	A rged.
Do. ...	Do. ...	Do.	Do.	A	A	A
Do. ...	Do. ...	Do.	Do.	A	A 11	A ozs.

Spleen.	Kidneys.		Stomach.	
	Right.	Left.	Cuticular portion.	Villous portion.
Healthy. 2 lbs. 11½ ozs....	Healthy	Healthy	Healthy	Healthy.
Small. Petechiæ dotted. 1 lb. 9 ozs.	Stellate veins injected. ...	Stellate veins injected ..	Bright yellow ... Boundary line bright orange.	A conjested patch square on mucous n brane. 3 extravasat on top of rugæ.
Ecchymoses dotted ... 6 lbs. 4 ozs.	Pale. 1 lb. 8 ozs. ...	Pale. 1 lb. 9 ozs. ...	Healthy	Healthy.
Petechiæ dotted ... 2 lbs. 14 ozs.	Healthy ... ... 3 lbs.	Healthy ... ... 3 ozs.	Do.	1 Spiroptera tumour mucous membrane.
Few petechiæ	Stellate veins injected ...	Stellate veins injected ...	Do.	Few ecchymoses. ulceration.
Petechiæ thickly dotted...	Pale. Few Sub-capsular petechiæ.	Pale. Few Sub-capsular petechiæ.	Do.	Mucous membrane thi ened. Two red patc of congestion.
Numerous petechiæ dotted.	Small petechiæ ...	Small petechiæ. Cortical substance, extravasation 1½″×1¼″.	Yellow ... ... Contracted to ⅛th its normal size and quite empty.	Many Spiroptera tumou Mucous membrane thi ened. One patch extravasation.
Petechiæ dotted ... ... 3 lbs.	Pale. Stellate veins injected 1 lb. 5 ozs.	Pale. Stellate veins injected. 1 lb. 6½ ozs.	Healthy	A clot of blood benea the mucous membrane
Convex surface. Few small petechiæ. 2 lbs. 9 ozs.	Pale ... ... 1 lb. 4 ozs.	Pale ... ... 1 lb. 4 ozs.	The line of demarcation.—Bright yellow in colour. No congestion or ulceration.	
Numerous raised lumps .. 2 lbs. 9 ozs.	Pale. No petechiæ ... 1 lb. 2½ ozs.	Pale. No petechiæ ... 1 lb. 3 ozs.	Healthy	Healthy ... ...
Enlarged. Petechiæ dotted.	Healthy	Healthy	Do.	Do. ... ...
Numerous petechiæ .. 4 lbs. 2 ozs.	Pale ... ... 1 lb. 11 ozs.	Pale ... ... 1 lb. 9 ozs.	Do.	Several patches of conge tion, 3 ulcers, one A caris Megalocephala.
Numerous petechiæ dotted. 4 lbs. 10 ozs.	Pale ... ... 1 lb. 5 ozs.	Pale ... ... 1 lb. 6 ozs.	Do.	Few congested patches o mucous membrane.
Enormously enlarged .. 11 lbs. 6½ ozs.	Much enlarged. 2 lbs. ½ oz.	2 lbs. 3 ozs.	Two larvæ of Gastrophilus equi attached to the mucous membrane. No ulceration.	3 spiroptera tumours be neath the mucous mem brane.
Large. Sub-capsular petechiæ. 1 lbs. 13 ozs.	Numerous dark coloured sub-capsular petechiæ.	Numerous dark coloured sub-capsular petechiæ.	Healthy	One spiroptera tumor 1·5 in diameter on mucou membrane.
Enlarged to 5 times normal size.	Healthy	Healthy	Do.	Healthy ... ...
Enlarged to 3 times normal size.	Do.	Do.	Do.	Do. ... ...
Enlarged to 3 times normal size.	Do.	Do.	Do.	Do. ... ...
Enlarged	Do.	Do.	Do.	Do. ... ...
Very small	Do.	Do.	Do.	Do. ... ...

XV—*continued.*

several cases under investigation.

l Intestines.	LARGE INTESTINES.				Bladder.	Brain.	REMARKS.
	Cæcum.	Colon.	Rectum.	Parasites.			
... ...	Healthy	Healthy	Healthy	A	Healthy	Healthy	
... ...	Do.	Do.	Do.	A	Do.	Do.	
eteehiæ dotted nucous membra- o ulceration.	Do.	Do.	Do.	Sp: Megast... ...	Do, ...	Do.	
... ...	Do.	Do.	Do.	A	Do.	Do.	
... ...	Do.	Do.	Do.	A	Do.	Do.	A nodule, the size of a walnut was lying free in the great omentum.
... ...	Do.	Do.	Do.	A	Do.	Do.	
... ...	Do.	Do.	Do.	Sp: Megast... ...	Contracted, 6ozs, urine, cluster of peteehiæ at the hase.	Do.	
... ...	Do.	Do.	Do.	A	Healthy	Superficial veins congested, convolutions flattened, Lat: Ven: 3 ozs. fluid.	
... ...	Do.	Do.	Do.	A	Do.	Superficial veins congested, Lat: ven: 5 ozs. fluid.	Petechiæ well marked on the conjunctival membrane.
membrane-Ee- sed patches dot- No ulceration.	Do.	Do.	Do.	A	Do.	Healthy	Visible mucous membrane Anæmic.
... ...	Do.	Do.	Do.	A	Do.	Do.	
æ dotted over nally.	Do.	Do.	Do.	Ascaris Megalosephala.	Do.	Superficial veins. Dark. Convolutions Pale. Increased fluid in Lat: ventricle.	
... ...	Do.	Do.	Do.	A	Do.	Healthy.	
... ...	Do.	Do.	Do.	Sp: Megast: ...	Do.	Do.	Mueous membrane covering the turbinated bones deeply congested. No ulceration. Yellow exudation in the subcutaneous tissue of the abdomen.
num, 3 small sub- us extravasations, extravas: invol- 3·5 feet midway een Pylorus and Valve.	Several small extravasations. Numerous small nematodes.	Do.	Do.	Do. ...	Do.	Do.	
ny	Healthy	Do.	Do.	A	Do.	Do.	
... ...	Do.	Do.	Do.	A	Do.	Do.	
... ...	Do.	Do.	Do.	A	Do.	Do.	
... ...	Do.	Do.	Do.	A	Do.	Do.	
... ...	Do.	Do.	Do.	A	Do.	Vessels congested. Convolution. Flattened. Lat; Ven: some fluid.	

TABLE

Showing the Pathological Conditions

Appendix VII.—continued.

Number.	Tissues.	Body.	Swelling and Œdema.					Pleural Cavities.		Trachea.	Lungs.	
			Extremities.	Scrotum	Sheath.	Under-surface of the Abdomen.	Chest.	Fluid.	Adhesions.		Right.	Left.
Guinea Pig No. I. (Sheep).	...	Somewhat emaciated.	A	A	A	A	A	A	A	......	General emphysema. Few petechiæ.	Few petechiæ.
Goat No. I.	...	Considerable emaciation.	A	A	A	A	A	A	A	......	Scattered patches of emphysema. Apex—Atelectasis. Base-Tissues deep red coloured and firm.	Apex and upper half. More or less state of atelectasis. Lower half.—Early condition of emphysema.
Do. II.	...	Emaciation...	A	A	A	A	A	A	A	......	Healthy	Healthy ... ...
Do. III.	...	Do. ...	A	A	A	A	A	A	A	......	Do.	Do. ... ...
Rabbit No. I.	...	Poorly nourished.	A	A	A	A	A	A	A	......	Patches of emphysema.	Patches of emphysema.
Do. II.	...	Emaciation...	A	A	A	A	A	A	A	......	Emphysema ...	Emphysema ...
Guinea Pig No. I.	...	Well nourished.	A	A	A	A	A	A	A	......	Circumscribed patches of emphysema. Extravasations.	Circumscribed patches of emphysema. Extravasations.
Guinea Pig No. II.	...	Emaciation...	A	A	A	A	A	A	A	......	Emphysema ...	Emphysema ...
Guinea Pig No. III.	...	Extremely emaciated.	A	A	A	A	A	A	A	......	Apex.—Emphysema. Middle lobe-Pneumonia.	Apex—Emphysema...
Guinea Pig No. (i).	...	Slight emaciation.	A	A	A	A	A	A	A	......	Emphysema ...	Emphysema ...
Guinea Pig No. (ii).	...	Emaciation...	A	A	A	A	A	A	A	......	Do. ...	Do. ...
Rat (M.dec) I.	...	Well nourished.	A	A	A	A	A	A	A	......	Healthy	Healthy ... ...
Do. II.	...	Emaciation...	A	A	A	A	A	A	A	......	Do.	Do. ... ...
Do. III.	...	Do. ...	A	A	A	A	A	A	A	......	Do.	Do. ... ...
Rat (N. p.) I.	...	Do. ...	A	A	A	A	A	A	A	......	Do.	Do. ... ...
Do. II.	...	Do. ...	A	A	A	A	A	A	A	......	Do.	Do. ... ...
Do. III.	...	Do. ...	A	A	A	A	A	A	A	......	Do.	Do. ... ...
Guinea Pig No. I.	...	Do. ...	A	A	A	A	A	A	A	......	Apex—Emphysema...	Apex—Emphysema...
Guinea Pig No. II.	...	Do. ...	A	A	A	A	A	A	A	......	Do. ...	Do. ...
Guinea Pig No. I.	...	Do. ...	A	A	A	A	A	A	A	......	Anterior lobe—Pneumonia.	Anterior lobe—Pneumonia.

rdial d.	HEART.			Fluid in Peritoneal Cavity.	LIVER.	
	Externally.	Internally.			Perihepatitis.	Concretions.
		Right.	Left.			
ss ...	Distended with firm clot. Numerous ecchymoses	Few petechiæ	Few petechiæ	A	A	A
chm. .	Distended	A. V. } Blood clots... ...	A. V. } Blood clots... ...	10 ozs.	Convex surface—A layer of lymph.	
ss ...	Healthy	Healthy	Heathy	A	A	A
...	Do.	Do.	Do.	A	P	A.
...	Distended. No endocardial extravasations.			A.	A	A
...	Distended with blood clots, no extravasations.			A	A	A
n ...	Healthy	Healthy	Healthy	A.	Large. Gall-bladder distended with clear fluid.	
ss ...	Do.	Do.	Do.	A	A	A
...	Distended with dark coloured clots.			A	A Large.	A
...	Distended with clots ...	A. V. } No petechiæ. Distended with dark clots.	Contracted ... A. V. } No petechiæ.	A	Large. Gall-bladder full of clear fluid.	
...	Distended with clots, no petechiæ.			A.	A Large.	A
...	Healthy	Healthy	Healthy	A	A	A.
...	Do.	Do.	Do.	A	A	A
...	Do.	Do.	Do.	A	A	A
...	Do.	Do.	Do.	A	A	A
...	Do.	Do.	Do.	A	A	A
...	Do.	Do.	Do.	A	A	A
...	Do.	Do.	Do.	A	A Enlarged.	A
...	Do.	Do.	Do.	A	A Enlarged.	A
...	Do.	Do.	Do.	A	A	A

Spleen.	Kidneys.		Stomach.	
	Right.	Left.	Cuticular portion.	Villous portion.
Much enlarged, 10 times normal size.	Small petechiæ. dotted.		Healthy	Healthy
Somewhat enlarged, convex surface. A layer of lymph.	Cortical portion—Mumerous yellow coloured Spherical concretions.		Do.	Do.
Healthy	Healthy	Healthy	Do.	Do.
Attached to the stomach hy firm hands of lymph.	Do.	Do.	Do.	Do.
Small	Do.	Do.	Pyloric mucous membrane considerably thickened.	
Healthy	Do.	Do.	Healthy	Healthy
Considerably enlarged. On section.—The tissues firm and full of hlood containing numerous hæmatozoa.	Do.	Do,	V. Shaped clot near pylorus. Mucous membr ulcerated.	
Very small	Do,	Do.	Healthy	Healthy
Enlarged to 3 times normal size.	Few petechiæ.		Pyloric extremity congested. No ulceration,	
Large. No petechiæ	Hcalthy	Healthy	Healthy	Healthy
Do.	Large	Large	Do.	Do.
Much enlarged. Patches of extravasations.	Healthy	Healthy	Do.	Do.
Mueh enlarged. Patches of extravasations,	Do.	Do.	Do.	Do.
Much enlarged. Patches of extravasations.	Do.	Do.	Do.	Do.
Considerably enlarged	Do.	Do.	On section—Dark red clot involves $\frac{1}{6}$th surfac mucous membranes. On removal petechiate spots found in the rugæ.	
Do.	Do.	Do.	Healthy	Healthy
Do.	Do.	Do.	Do.	Do.
Enlarged enormously	Do.	Do.	Do.	Do.
Enlarged	Do.	Do.	Do.	Do.
Euormously enlarged	Do.	Do.	Do.	Do.

he several cases under investigation.

nall Intestines.	LARGE INTESTINES.				Bladder.	Brain.	REMARKS.
	Cæcum.	Colon.	Rectum.	Parasites.			
hy	Healthy	Healthy	Healthy	A	Healthy	Healthy	
... ...	Do.	Do.	Do.	A	Do.	Lat : Ven : considerable quantity of milky fluid. Atrophy cerebral cortex from presure.	Omentum dottad over with petechiæ. Hydatid cyst, size of walnut attached to omentum in L, lumbar region.
... ...	Do.	Do.	Do.	Cænurus cerebralis.	Do.	Cystic tumour ...	Testicles—T. V. wall adherent L. T. on section seat of inflamatory change.
... ...	Do.	Do.	Do.	A	Do.	Convolutions —Flattened Lat: Ven: dilated with colourless fluid.	Testicles-Hard, Cord thichened.
enum distended i gas.	Do.	Do.	Do.	A	Greatly distended with urine.	Healthy	Swelling of integument nose, mouth and eyes.
hy	Do.	Do.	Do.	A	Healthy	Do.	
... ...	Do.	Do.	Do.	A	Do.	Do.	
... ...	Do.	Do.	Do.	A	Do.	Do.	
... ...	Do.	Do.	Do.	A	Do.	Do.	
... ...	Do.	Do.	Do.	A	Do.	Do.	
... ...	Do.	Do.	Do.	A	Do.	Do.	
... ...	Do.	Do.	Do.	A	Do.	Do.	
... ...	Do.	Do.	Do.	A	Do.	Do.	
... ...	Do.	Do.	Do.	A	Do.	Do.	
... ...	Do.	Do.	Do.	A	Do.	Do.	
... ...	Do.	Do.	Do.	A	Do.	Do.	
... ...	Do.	Do.	Do.	A	Do.	Do.	
... ...	Do.	Do.	Do.	A	Do.	Do.	
... ...	Do.	Do.	Do.	A	Do.	Do.	
... ...	Do.	Do.	Do.	A	Do.	Do.	

TABLE XVI.

Showing the number of cases in which the various Pathological conditions were present or absent, and the different organs healthy or unhealthy.

	BODY.					SWELLING AND ŒDEMA.										PLEURAL CAVITIES.				Trachea.		LUNGS.												Pericardial fluid.	
						Extremities.		Scrotum.		Sheath.		Under-surface of Abdomen.		Chest.		Fluid.		Adhesion.				Emphysema.				Pneumonia.				Concretions.					
																						Right.		Left.		Right.		Left.		Right.		Left.			
	Emaciation.	Slight Emaciation.	Extreme Emaciation.	Well nourished.	Considerable emaciation.	P.	A.	P.	A.	P.	A.	P.	A.	P.	A.	P.	A.	P.	A.	P.	A.	P.	A.	P.	A.	P.	A.	P.	A.	P.	A.	P.	A.	P.	A.
Appendix I	8	9	1	1	...	5	14	...	19	1	18	2	17	6	13	7	12	2	17	2	17	16	3	15	4	4	15	7	12	2	17	2	17	15	4
Do.	1	1	...	...	...	1	1	...	2	...	2	...	2	...	2	...	2	...	2	...	2	2	...	2	...	1	1	...	2	1	1	1	1	1	1
Do. III	...	1	...	1	...	1	1	1	1	2	...	2	...	...	2	...	2	...	2	1	1	2	...	2	...	...	2	...	...	...	...	...	...	1	1
*Do. IV	5	3	...	1	2	6	5	3	8	2	9	5	6	1	10	3	8	1	10	1	10	5	6	5	6	1	10	...	...	...	9	3	8	8	3
Do. V	1	3	...	1	2	1	6	3	4	3	4	4	3	3	4	1	6	...	7	...	7	3	4	4	3	...	7	1	6	1	6	1	6	3	4
Do. VI	2	3	...	2	...	3	4	1	6	1	6	3	4	...	7	...	7	...	7	...	7	4	3	4	3	...	7	2	5	3	4	4	3	4	3
Do. VII	17	4	1	3	1	...	26	...	26	...	26	...	26	...	26	1	25	...	26	1	25	15	11	15	11	4	22	2	24	...	26	...	26	2	24

P = Present. A = Absent.

* Out of the 13 cases of Appendix IV two of the animals had undergone decomposition.

TABLE XVI—*continued.*

Showing the number of cases in which the various Pathological conditions were present or absent, and the different organs healthy or unhealthy.

	HEART.						Fluid in peritoneal Cavity.		LIVER.				Spleen.		KIDNEYS.				STOMACH.				Small Intestines.		LARGE INTESTINES.								Bladder.		Brain.	
	Externally.		Internally.						Perihepatitis		Concretions.				Right.		Left.		Cuticular portion.		Villous portion.				Cæcum.		Colon.		Rectum.		Parasites.					
			Right.		Left.																															
	H.	N. H.	H.	N. H.	H.	N. H	P.	A.	P.	A.	P.	A.	H.	N. H.	H.	N. H.	H.	N. H.	H.	N. H.	H.	N. H.	H.	N. H.	H.	N. H.	H.	N. H.	H.	N. H.	P.	A.	H.	N. H.	H.	N. H.
Appendix I ...	4	15	3	16	3	16	4	15	17	2	7	12	1	18	7	12	9	10	15	4	1	18	9	10	13	6	15	4	15	4	13	6	12	7	15	4
Do. II ...	1	1	...	2	...	2	...	2	2	...	1	1	...	2	1	1	1	1	1	1	1	1	1	1	2	...	2	...	2	...	...	2	2	...	2	...
Do. III ...	...	2	...	2	...	2	1	1	2	...	2	...	...	2	...	2	...	2	1	1	1	1	...	2	2	...	2	...	2	...	1	1	2	...	2	...
Do. IV ...	1	10	2	9	...	11	1	10	8	3	7	4	1	10	4	7	4	7	8	3	3	8	8	3	11	...	11	...	11	...	2	9	10	1	10	1
Do. V ...	2	5	...	7	...	7	...	7	7	...	5	2	1	8	2	5	2	5	5	2	2	5	6	1	7	...	7	...	7	...	2	5	6	1	7	...
Do. VI ...	1	6	1	6	...	7	1	6	6	1	5	2	...	7	1	6	1	6	5	2	2	5	5	2	7	...	7	...	7	...	3	5	7	...	4	3
Do. VII ...	19	7	18	8	19	7	1	25	3	23	...	26	2	24	22	4	22	4	22	4	21	5	24	2	25	1	26	...	26	...	2	24	25	1	22	4

H = Healthy. N H = Not healthy.

SECTION XIII.

Experimental Enquiry into the Treatment of Surra.

Few observers have tried any systematic treatment with regard to 'Surra' cases, and those few who have, unfortunately have only had negative results to record.

Evans tried Carbolic Acid in Glycerine (1 in 4) in large doses in four cases, but all succumbed. The late Veterinary Surgeon Steele informed me, that he had made a series of experiments with different drugs, especially mentioning Mercuric perchloride, but that all his cases in like manner proved fatal.

Pottinger experimented with large doses of Sodii. Hyposulphis. and Potass. Nitras. given in drinking water. He also tried Arsenic, Aconite, and Quininæ Sulphas, but was unable to find that any of these drugs exercised any control over the disease. Frost tried Sodii Hyposulphis, Salycilic and Carbolic Acids, but these were in all cases ineffectual.

In my own experiments, horses submitted to experimental treatment comprised—

(i) The subjects of naturally contracted Surra.
(ii) The subjects of experimental inoculation.

The methods of treatment made use of include—

(A) Rational therapeutic remedies.
(B) The subcutaneous inoculation of blood and its derivatives in its different forms, obtained from animals suffering from, or which had lately succumbed to, Surra.
  (*a*) Serum from blood (the latter containing swarms of the Surra hæmatozoa), after being passed through a porcelain filter.
  (*b*) The injection of proteids dissolved in Glycerine and water, after precipitation from live Surra blood.
  (*c*) Subcutaneous injection of blood obtained from an animal of the bovine species, recently the subject of Surra, but which after a second inoculation of virulent material was proved protected against the disease.

The plan which has been adopted in the following pages is first to describe the various chemicals with regard to their respective bacteriocidal and antiseptic properties, and then to give a short resumé of the several cases in which they have been employed, together with the results.

A.—Rational therapeutic remedies.

The following chemicals were selected as being those most likely to effect a destructive action on the hæmatozoon :—

Mercuric Perchloride	$HgCl_2$
Iodine and Potassium Iodide	I ; KI.
Potassium Bichromate	$K_2Cr_2O_7$
Iodoform	$C H I_3$
Oleum Terebinthinæ	
Carbolic Acid and Iodine	C_6H_6O
Cinchona Alkaloids and Arsenic in combination.	
Double Iodide of Potassium and Mercury.	
Quinine Sulphate.	
Liq. Potassæ	KHO
Arsenic	AS.

Mercuric Perchloride is one, if not the most powerful, antiseptic known. It has the power of combining with albumen, forming albuminates, and according to M. de la Croix,* confirmed by Koch, 1 : 6500 of water sufficed to prevent the reproduction of Anthrax and other spores; while, 1 : 7168 prevented the development of spores in unboiled meat infusion. As the 'materies morbi' of Surra is an infusorian, consisting of differentiated protoplasm, it was hoped that the action of this chemical substance on subcutaneous injection, would at first act upon the hæmatozoa, and that by a more prolonged exhibition of the drug, the resting form might be attacked, and eventually overcome.

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* Lauder Brunton Pharmacology and Therapeutics, page 90.

Case No. VI was the first in which Mercuric Perchloride was tried. The disease was produced artificially by the subcutaneous inoculation of a small quantity of soiled blood. During a period of six days the animal received 2·6 grammes (39 grains) of Mercuric Perchloride, (one cubic centimetre of the injected fluid containing one decigramme of the chemical), without its having produced any apparent effect upon the hæmatozoon. In the course of a few hours after its administration, a raised swelling appeared at the seat of each injection, formed by the exudation into the subcutaneous tissues of a jelly-like material. In the further treatment of this case, Iodine and Iodide of Potassium were substituted for the foregoing drug.

In a second case, No. VIII, after the previous experience of the subcutaneous action of Mercuric Perchloride, it was decided to directly inject the solution containing a large dose of the chemical, into the general circulation, in order if possible to overcome the hæmatozoon at once, and thus to allow the effect of the mercury lasting for a considerable period. For this purpose, 0·6 gramme was mixed with Glycerine and water, and injected into the Jugular Vein. Although very serious symptoms of poisoning were produced by pushing the administration of the drug thus far, hourly microscopical examination of the blood for the next seven hours failed to detect any diminution in the number or activity of the Trypanosoma, and they continued to be present in the blood for the next three days.

Iodine and Iodide of Potassium.

Iodine is known to be a powerful antiseptic and oxidising agent, and in addition Koch found that it possesses the power of correcting the movements of protoplasm. The spores of certain organisms were destroyed, and their germination prevented after exposure for 24 hours to a solution of Iodine in water, of the strength of 1 in 7,000. For these reasons it was determined to try its effects upon the Surra hæmatozoon.

Hyd. Perchlor.

Case No. VI.—It was decided to subject this animal to the action of Hyd. Perchlor. by giving daily subcutaneous injections of the drug, as being more powerful and rapid in its action when given in this way, than when administered by the mouth. The time chosen for commencing the exhibition of the drug was during the absence of the hæmatozoon from the blood, which as a rule, or more correctly speaking, frequently coincides in point of time with an apyrexial period. It will at once be recognized, that by commencing the subcutaneous injection of a drug during such a period, if it extends over two or three days, the experimenter is able to place the animal experimented upon partially under the influence of the drug, before the reappearance of the organism in the blood. Consequently on the morning of the 3rd December, on the second day on which the hæmatozoon had been absent from the general circulation, 1·5 c.c. of the following solution was injected subcutaneously:—

R. Hydrargyri Perchloridi, x grammes.
Ammonii Chloridi, x grammes.
Glycerini, xxx c. c.
Aquæ distill., lxx c. c.

One decigramme of Hyd. Perchlor. in 1·0 c. c. of the solution.

The temperature at the time of the injection registered 37·7°C. and the same evening was 0·4°C. lower. On the following day the temperature was 37·2°C., and the hæmatozoon still absent from the blood. No symptom having been produced as a consequence of the injection, a larger dose was given, namely 3·0 c.c. of the solution; the same evening the thermometer registered 38·5°C., but by the morning of the 5th had again fallen to 38°C. On examination of the blood a few organisms were found, but they did not exhibit very active movements. The dose was not increased, but the same quantity was again subcutaneously injected. This was followed by a rise in the temperature to 38·8°C. at 5 P.M., and by a slight fall on the morning of the 6th to 38·3°C., but the organism was found to have become numerous on microscopical examination of the blood. Consequently the dose was increased to 4·5 c.c. administered in the same way as previously. The temperature began to rise at once, and by midday attained 39·2°C., and when recorded at 5 P.M., was found to register 39·8°C. On the morning of the 7th the temperature was 41°C., the animal had not lost in condition, and the œdema previously present appeared to have diminished during the treatment, as well as there being an improvement in the gait. The hæmatozoa were still numerous in the blood. The dose was again increased and 7 c.c. were given as before; by five P. M. the thermometer showed a fall of three quarters of a degree Centigrade, and during the night a somewhat sudden fall of 2·5°C. to 37·8°C. took place, and the hæmatozoon in the blood fell in numbers to *few*. There appeared, however, an eruption of urticaria general in character, but not particularly well marked. This was not deemed of sufficient importance to contra-indicate the administration of the drug, and consequently the animal again received a similar amount to that which was the day before injected. During the day and the following night the temperature remained low, and the eruption, which had commenced to fade the evening previously, had now entirely disappeared. On examination of the blood the organism was found to be again present in large numbers, and as 2·6 grammes (39 grains) had been administered during a period of six days, without producing any apparent action on the hæmatozoon, it was deemed advisable to substitute this by some other form of treatment. It was therefore decided to make use of the following solution in the further treatment of the case :

R. Iodum—1·5 grammes.
Potass Iodidi—7·5 grammes.
Aquam ad.—100 c. c.

Instead of continuing the subcutaneous method previously employed, another one was substituted, namely, the direct injection of the fluid into the trachea, by means of a Pravaz Syringe, the needle being introduced between the cartilaginous rings. It was hoped that by this means the medicament being diffused through the lungs would have an opportunity of being brought into contact with the minute network of capillaries in these organs, and of acting upon the hæmatozoon contained in the large mass of blood circulating through them, and that its effect would be thus increased.

Iodine. Potass. Iodid.

Consequently on the morning of the 9th December, the temperature of the animal registering 39·3°C., a small quantity of the solution containing Iodine 0·12 gramme and Iodide of Potassium 0·6 gramme was injected into the trachea, but did not appear to cause the animal any discomfort. The temperature the same evening rose to 40°C. and on the morning of the 10th had reached 40·3°C. the hæmatozoon still being numerous in the blood. A similar quantity was now injected and in the èvening the temperature rose to 40·6°C. On the morning of the 11th the temperature was 40·3°C. and again the organism was found to be numerous in the blood, so it was decided to increase the quantity of the medicament. At 9 A.M. a quantity of the solution containing Iodine 0·24 gramme, and Potass Iodidi 1·2 grammes was injected, the temperature fell slightly during the day, and on the following morning registered 39·1°C., the organism having been reduced at the same time to few. The increased dose of the previous day was again employed, and the temperature after rising to 40°C. the same evening, fell on the morning of the 13th to 38·6°C., and the hæmatozoon was found to be absent from the blood. The reduced dose of Iodine 0·12 gramme and Potass Iodidi 0·6 gramme was again utilized in order that a minimum amount of irritation only might be produced. The temperature registered 38·6°C. on the morning of the 14th, but the hæmatozoon was again present in small numbers; a similar quantity of the drugs was again injected, the evening temperature rising to 39·2°C. and remaining at the same height until the morning of the 15th, when on microscopical examination the organism was found to be numerous in the blood. On this day the animal was suffering from a slight cough, but as it was deemed inadvisable to discontinue the administration of the medicament, it received a similar amount of the solution to that given on the day previously. The thermometer registered 40·2°C. at the evening observation. On the 16th a slight remission took place, but after an injection of the solution containing Iodine 0·48 gramme and Potass Iodidi 2·4 grammes, the degree registered was 41·1°C. On the morning of the 17th the temperature was found to be 40·1°C., a fall of one degree during the night, and the hæmatozoon to be reduced in numbers. Accordingly as there was no contra-indication, a similar quantity to the last dose was injected. On the morning of the 18th there was considerable swelling and œdema at the seat of the injections, and for some distance round the trachea. There was also increased œdema of the sheath and under-surface of the abdomen, and the temperature was 40·4°C. As the hæmatozoa were decreased in number, the 'locale' of the injection was changed, and the solution was subcutaneously administered, the animal receiving Iodine 0·15 gramme, Iodidi of Potass 0·75 gramme, the temperature remaining at or about the same degree until the following day, the 19th, when taking into consideration the amount of the respective drugs administered and the condition of the animal, it was thought that a fair trial had been given to this form of treatment.

Iodoform ($C\ H\ I_3$).—This chemical has the property of destroying certain bacilli, and is an antiseptic and deodorizer of very considerable power. It also destroys leucocytes. It has been used with considerable success in the treatment of gangrenous stomatitis. This drug also possesses one great advantage, that when applied in substance or strong solution, it produces no local irritation, but acts as a local anæsthetic. It also prevents the development of giant cells, and may thus prevent morbid tissue growth.

Iodoform.

Case No. VIII.—As this animal was a strong one, it was decided to try the effect of Iodoform on the hæmatozoon. Accordingly on the 30th December 1890, the organism being absent, three grains of Iodoform in ether were injected subcutaneously, and on the following morning a further dose of four grains was administered in the same way, but in the meantime the organism had re-appeared in the blood. On the 1st January 1891, five grains of Iodoform in ether were directly injected into the Jugular Vein, but on the 2nd the hæmatozoon was present in increased numbers; fourteen grains were therefore directed into the general circulation, with no untoward symptoms resulting. On the following morning, the 3rd of January, twenty-five grains of Iodoform were injected directly into the right Jugular Vein. But, although the animal was carefully watched throughout the day, no sign of uneasiness, or other symptom was manifest. On examination of the blood, on the morning of the 4th, the hæmatozoa were found to be numerous and active; as therefore the Iodoform appeared to have no action whatever upon the hæmatozoon, it was decided to try some substance known to have a powerful action upon other organisms. For this purpose Mercuric Perchloride was chosen. At 11 A.M. Hydrargyri Perchloridi, Glycerini 10 c.c. and distilled water 6 c.c. carefully mixed, were injected directly into the right Jugular Vein. One hour and twenty minutes after the administration of the drug, the animal lay down having passed fæces of a pultaceous character, on three occasions previously, and urine twice. At 1 P.M. the temperature was 39°C., having previous to the operation registered 38·2°C. P.52. At this time, as also at 3 P.M., the animal passed a quantity of pale, straw coloured urine, containing a slight trace of albumen, and some phosphates; the blood on both occasions presented numerous hæmatozoa on microscopical examination. The temperature at 5 P.M. had become considerably elevated, 41·6°C., but from the chart it is difficult to be certain that the elevation was in any way influenced by this administration of the drug, as on the day but one previously the same degree was registered within one or two points.

On the following morning, the 5th January, the temperature had regained the exact degree registered previous to the exhibition of the Mercury, but the hæmatozoon was still present and active in the blood, although in small numbers. During the next five days the organism was only absent for twenty four-hours, namely, on the third day, and on its re-appearance presented itself in increased numbers. Serious symptoms of a gastro-intestinal nature were present during the last five days of the animal's life, as evidenced by the fact that the dung was coated in places with a small quantity of blood, and that absolutely no fæces were passed between the evening of the 7th, and the day of its death.

Oleum Terebinthinæ.—"Turpentine is a general stimulant acting on the heart and vaso-motor centres and nerves. Injected into the veins of a horse, it is said to cause fatal pulmonary congestion. It poisons lice, acari, entozoa, whether lodged in the bowels, bronchial tubes or skin, and arrests fermentation and putrefaction; also destroys vibriones and bacteria" (Finlay Dun).

On microscopical examination it was observed that the effect of this oil in minute quantities was the production of a torpid condition, shortly followed by death. Koch's results show, that spores have their vitality diminished in one day on exposure to turpentine oil, and that after a period of five days' exposure to the same material, the spores are destroyed, and their germination prevented.

Oleum : Terebinthinæ.

Case No. XIV.—This animal being in fair condition and apparent good health was thought to be a good case for trying the effect of Oleum Terebinthinæ upon the hæmatozoon. On the morning of the sixth day of the disease—temperature 38·5°C., continued fever having previously been present during a period of five days, and the Surra organism varying between few and very numerous in the blood, 8 c. c. of Oleum Terebinthinæ were injected subcutaneously, but with no visible effect. The temperature rose the same evening to 38·8°C. and in the morning had again fallen to 38·4°C., P. 40, R. 33, the hæmatozoon still being present in small numbers in the blood. As such a slight effect had been produced by the previous dose, it was determined to directly inject a similar quantity into the general circulation, consequently at 12·40 P.M. 8 c. c. were exhibited in the above mentioned way. Five minutes later, the pulse from being fairly good had become barely perceptible, the respirations had increased to 60 per minute from 33, and muscular twitchings were present in both flanks. The animal lay down and, almost immediately, assumed the erect position again. Liq : Ammoniæ in equal parts with water was injected subcutaneously at 1 P.M. and was again followed by a second injection twenty minutes later. The pulse shortly afterwards became stronger, and the animal lost all discomfort produced by the drug. On examination of the blood, the hæmatozoa appeared torpid, and to have lost all power of movement. The temperature fell that evening to 38°C., but on the following morning had become somewhat higher, and the hæmatozoa were still present in exactly the same numbers in the blood as found previous to the injection. The animal had quite returned to its normal condition. On the morning of the ninth day of the disease, the organism was absent from the blood, but œdema was present, lying subcutaneously along the course of the trachea and on either side of it, and spreading over the pectoral muscles. It was also well marked at the seat of the injection of the Liq: Ammoniæ. On the tenth, the hæmatozoa were numerous, and on the eleventh day they had increased to very numerous. Consequently 12 c. c. of a Oleum Terebinthinæ were injected into the trachea; after seven or eight minutes the animal showed signs of colicky pains, which however quickly subsided. There was increased peristalsis, and an escape of flatus per anum. Temp. P.M. 39·5°C. On the following morning the temperature had fallen 1·3°C., but the organism remained the same in point of its numbers in the blood. On the thirteenth day of the disease, 8 c. c. of the same medicament were injected into the trachea. A short time subsequently a small drop of blood was drawn from the thin integument of the muzzle sufficient to make three cover-glass specimens, and then the part was pressed to obtain a further drop. On microscopical examination all the three specimens obtained from the first sample of the blood contained the hæmatozoon, but in those made from the last drawn, although submitted to careful microscopical examination, the hæmatozoon was entirely absent. It would thus appear that all the organisms had, on the injection of the Oleum Terebinthinæ, left the large vessels, and collected in the superficial capillaries. As for the next three days following the last exhibition of the drug, the organism had increased considerably, instead of having become reduced in numbers, this treatment was not persisted in.

Potassii Bichromas.—A solution of this drug possesses the power of hardening animal tissues when immersed in it. In [*] Mammals, it is said to cause vomiting, diarrhœa, and bloody stools, great feebleness, and general clonic movements. In rabbits and guinea-pigs, convulsions and paralysis occur, chiefly affecting the posterior limbs. *Post-mortem.*—A red colouration of the muscles is observed, and the gastric and intestinal mucous membranes are congested.

Orfila observes: " Dans ses experiences sur les animaux, est arrivé, avec d' assez petites doses de $K_2Cr_2O_7$ á determiné la mort."

Orfila and Christison.—"Le bichromate de K paralyse le Cœur."

Gmelin.– " Une action paralysante sur le systeme nerveux."

Cumin.—" Tue en frappant de mort les globules sanguins."

In my own case, no symptom of any kind was produced by the direct injection of five grains into the general circulation, and the chemical had no effect upon the Surra hæmatozoon. This dose was followed on the third day by seven and a half grains, and on the fourth day by eleven grains, administered in a similar manner; but again no untoward symptoms resulted, except at the seat of the injection, where a localized œdema was produced. Owing to this complication, the further exhibition of the medicament was restricted to gastric ingestion; 2378·5 grains were administered to the animal in a period of sixteen days, without affecting its appetite and without producing any marked effect upon the organism in the blood.

Potass: Bichromate.

Case No. XV.—On the third day of the disease with a temperature of 38·6°C., and the hæmatozoa very numerous in the blood, five grains (0·33 gramme) of Potass Bichromate in water were injected directly into the Jugular Vein. That evening the temperature remained at the same height as that registered in the morning before the operation, but on the fourth day it had risen to 39·9°C., but the hæmatozoon had not altered in numbers. On the morning of the fifth day, the temperature was 39·5°C., and the organisms were numerous in the blood. Seven and a half grains (0·5 gramme) were again administered in the same way as the previous dose, and this was followed next day by eleven grains (0·73 gramme) given as before. On the seventh day, the organism was absent from the blood, but the same degree of temperature was maintained. On the morning of the eighth day, the thermometer registered 37·7°C., a fall of two degrees Centigrade from the previous night, and the organism had re-appeared with blood. No bad symptoms had been produced by the exhibiting of the drug so far, with the exception of a local œdema at the seat of the injection. But as it became evident that a much larger dose must be given, and if possible gradually increased, it was deemed advisable to administer the drug by the mouth. Consequently on the ninth day of the disease, one drachm (4 grammes) of Potass Bichromate was given in a pint of water. On the day following the temperature had risen, and the hæmatozoa were numerous in the blood, and although during a period of five days from the tenth to the fifteenth day inclusive, 280 grains or (18·6 grammes) were administered, nevertheless, the organisms remained numerous in the blood, and the temperature steadily rose. During the fifteenth and sixteenth days, 165 grains (11·0 grammes) were given, the hæmatzoon being few in number in the blood, but on the seventeenth they again became numerous, and the temperature registered 38°C., the animal receiving on this occasion 160 grains (10·66 grammes). On the morning of the eighteenth day, the temperature was 40·1°C. and the hæmatozoon was absent, but by 5 P.M. the thermometer registered 41·8°C.; during the day the animal received Potass. Bichromate 190 grains (12·66 grammes). On the morning of the nineteenth day, the temperature had fallen to 39·5°C. and the organisms were absent from the blood. Again during the night the temperature fell and next morning registered only 37·8°C., but the hæmatozoon was again present. From the morning of the 20th until the evening of the 24th day of the disease, very large doses of the drug were administered, viz. an average of one hundred and fifty grains (10 grammes) twice a day, or 1,500 grains (100 grammes) in all. The drug was discontinued on account of the ejection by the animal of some blood-stained mucus on coughing, the first symptom observed during the exhibiting of the Bichromate, or of anything referable to its action. The appetite of the animal was good during the whole period of treatment, but as on the nineteenth day of the disease the animal refused to take any water to drink, the treatment was omitted for twenty-four hours.

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[*] Lauder Brunton, loc. cit, p. 616, 3rd edition.

It will be noted that doses of five, seven and a half, and eleven grains injected into the general circulation failed to produce any appreciable symptoms, with the exception of a localized œdema at the seat of inoculation. Further it is a point of great clinical importance, that after a course of large doses of the drug, which attained a maximum of 360 grains (24·0 grammes) in the twenty-four hours, and amounted to nineteen hundred grains (126·6 grammes.) in all, the animal should have maintained fairly good health, and the hæmatozoon should have still continued to be numerous in the blood.

Mixed Cinchona Alkaloids.—This preparation is made from the red Cinchona bark, grown at the Government plantations, Darjeeling, and contains all the febrifugal alkaloids of the Cinchona Succirubra, in the relative proportion in which they naturally exist in the bark.

Its efficiency in the treatment of fever has been carefully tested by a number of experienced medical officers. The reports received clearly show that it possesses, to very nearly the same extent, the antiperiodic properties of quinine, and may be safely substituted for the latter in the treatment of ordinary fever and ague.

Arsenic.—" Arsenic is a powerful antiperiodic, nearly rivalling quinine. Repeated full doses act as a protoplasmic poison. It paralyses first the nervous centres, then the nerves, and lastly the muscles. Motor are believed to suffer before sensory and reflex functions. The heart is early and directly affected, the blood pressure is diminished, the activity of the respiratory centre is lowered, and oxygenation is impaired.

" Arsenic is excreted by the kidneys chiefly, also stomach, liver and intestines. It is said to arrest the formation of Glycogen " (S. Ringer).

" The curative effects seldom occur until physiological action is established."

" Arsenic destroys the germs of yeast, and kills some micrococci."

Koch found experimentally that spores were destroyed, and their germination prevented, by exposure for ten days to a one per cent. (1%) solution of Arsenic in water.

Cinchona Alkaloids and Arsenic.

Case No. LXV.—It was decided to attempt curative treatment although it was recognized that the animal had already been suffering from the disease for a period of at least twenty-three days. It was thought advisable to commence the treatment when the number of hæmatozoa in the blood should be on the decline, and accordingly on the 14th June, the hæmatozoa being few, treatment with Cinchona Alkaloids and Arsenic in large doses was commenced. On the 20th the hæmatozoa disappeared from the blood, but the temperature and respirations remained above normal. The general symptoms of Surra increased up to the 24th, œdema and swelling of the limbs, sheath, and under the abdomen increased in extent, the animal steadily losing condition, the muscles wasting and the gait staggering and uncertain. On the 25th the animal had decidedly improved, and it was noticed that the œdema of the sheath and abdomen was distinctly less in amount; the animal seemed brighter and moved freely about the loose box. This amelioration of the symptoms was gradually progressive, and on the 2nd July the œdema under the belly had completely disappeared, whilst that on the legs was scarcely perceptible, and had on the 4th completely disappeared. On the 3rd July, however, the temperature began to rise steadily, and it continued high until the 9th, notwithstanding the fact that no hæmatozoa were present in the blood. During this time the animal presented symptoms, which might be accounted for by the continued high temperature, although on the 6th, symptoms of kidney disorder presented themselves, followed by epithelial casts, and a small number of blood corpuscles in the urine. The large doses of Arsenic and Alkaloids have been persisted in, notwithstanding the intestinal and hepatic derangements, as it was feared that the high temperature indicated the probable return of the Surra hæmatozoon. On the 9th there were symptoms of gastro-intestinal catarrh, and taking these complications into consideration, as well as the fact that the hæmatozoa had been absent from the blood for a period of twenty days, it was decided to discontinue the Arsenic and Alkaloids entirely, and a laxative and simple febrifuge was substituted. From the 10th to the 14th all went well, and the animal seemed to improve, the temperature remained low, and the animal became much brighter and fed well. On the 15th, however, he was dull and the respiration and pulse had increased in frequency, the visible mucous membranes becoming of a dirty-yellow colour and petechiated. On the 16th although his appearance was brighter, the respirations had risen very high, and the heart's action was irritable; the symptoms of gastro-intestinal catarrh and the kidney disorder had entirely disappeared. On the 17th the animal appeared in much the same condition, but the respirations were less although the temperature was a little higher. On this date one "Surra" hæmatozoon was discovered in two cover-glass specimens of blood, and this was the first organism observed during a period of twenty-eight days. The previous treatment of Arsenic and Cinchona Alkaloids was at once resumed. On the 18th the animal had not altered much in appearance, the respirations were greatly improved in character and the pulse in frequency, but the temperature had risen. The blood contained a few hæmatozoa, but not so active in their movements as the one noticed the day before. On the 19th the condition was worse, the hæmatozoa very numerous in the blood and the temperature much elevated, viz., 41°C. On the 20th the appetite was normal, but otherwise the animal did not manifest any improvement; only two hæmatozoa were observed in two cover-glass specimens of the blood, and these were exceedingly torpid. On the 21st the hæmatozoa were entirely absent, and from this date the animal appeared to be unable to throw off the effect which the return of the hæmatozoon had given rise to, and he gradually became weaker, and died on the 29th of July, although the hæmatozoa were absent during the last nine days.

Acidum Carbolicum.—This precipitates albumen, and destroys low organisms. In animals it also affects the cerebrum, as shown by alterations in sensibility and motor power; it stimulates the sweat centre and salivary centres, producing perspiration and salivation. One ounce of Carbolic Acid has only a slight and transient effect upon horses. Both poisonous and medicinal doses are excreted by the lungs and skin, but chiefly by the kidneys, and is converted in part into Indican and Oxalic Acid. One part of Carbolic Acid to six hundred and sixty-nine (1 : 669) parts of water sufficed to prevent the development of bacteria taken from meat infusion, whilst one part to twenty-two (1 : 22) was found necessary to prevent the reproduction of spores. And Koch found that a dilution of Carbolic Acid 1 in 1250, and 1 in 850 sufficed to prevent the growth of anthrax bacilli, while a strength of 1 in 500 was required to prevent the growth of others.

In this experiment Carbolic Acid and Iodine were mixed; seventy-six drachms of the former, and thirty-four and a half drachms of the latter were administered in a period of 6 days.

Carbolic Acid and Iodine.

Case No. LXX.—It was decided in this case to endeavour to destroy the organism, by the exhibition of large and frequently repeated doses of an antiseptic, pushing it if necessary to such a degree as to cause toxic symptoms in the animal, but stopping short of causing actual poisoning. Carbolic Acid and Iodine mixed in a suitable vehicle were the agents selected, as it is said that in some cases of specific disease, their use has been attended with marked success.

The method to be adopted in the administration of the drug was one calculated to insure its absorption in comparatively small, but gradually increasing quantity. With this end in view, on September 25th two drachms of Carbolic Acid and half a drachm of Iodine were administered as a first dose, and followed at intervals of an hour by one drachm of Carbolic Acid and half a drachm of Iodine. The animal up to the morning of the 26th had received Carbolic Acid fifteen drachms and seven of Iodine. This amount of the drugs produced no untoward symptoms, beyond an increase in the number of respirations. On microscopical examination of the blood, very numerous hæmatozoa were found. During the rest of the day the animal received four drachms of Carbolic Acid, and two drachms of Iodine. On the morning of the 27th it appeared better, but the respirations still remained high. No hæmatozoa were discovered in the blood on microscopical examination, but we were unable to decide whether this absence was the result of the treatment, or whether it was one of the natural phases of the disease. It was, therefore, rosolved to continue the medicine, and the horse received during the day Carbolic Acid drachms vi, and Iodine drachms iij. On the morning of the 28th, the animal looked bright and well, the number of respirations had decreased considerably, but a microscopical examination of the blood revealed the presence of a few hæmatozoa. The amount of Carbolic Acid and Iodine was therefore increased, twelve of the former and six and a half drachms of the latter being administered during the day. From the 29th the general condition of the animal was unchanged, and there were few active hæmatozoa in the blood. The amount of the medicine was therefore again increased, the animal receiving Carbolic Acid drachms xxiv, and Iodine drachms viii. On the 30th no effect appeared to have been produced on the health of the animal by the drug, the appetite and general appearance being as before. The only effect noticed being in connection with the urine, which assumed a brownish-black colour, and exhibited an inky line on the addition of a small quantity of Nitric Acid. On microscopical examination of the blood, the organisms were found to be numerous. The animal received during this day Carbolic Acid drachms xv, and Iodine drachms viijs. On October 1st the animal showed the first symptoms which might be referred to the action of the drugs, appearing slightly uneasy after taking food. On microscopical examination of the blood, no hæmatozoa were detected. Taking into consideration the symptoms evinced by the animal, it was decided to discontinue the administration of the medicine, as it was deemed to have had a fair trial in this case, when it is considered that the administration of pure Carbolic Acid seventy-six drachms, and Iodine thirty-four and a half drachms, produced so little effect on the organisms. It is apparently evident, that their use as remedial agents in this disease is of little practical value. From October 1st to the 4th no organisms were detected in the blood, the uneasiness passed off, and no further effect of the medicine was noticeable. On the morning of the 4th October a few hæmatozoa were discovered in the blood, and it was consequently decided to again adopt treatment with Cinchona Alkaloids and Arsenic. Accordingly Cinchona Alkaloids one and a half drachms, and Arsenic grs. iv were given twice during the day, and these doses were continued until the evening of the 6th, when they were increased to two drachms and five grains respectively, and these doses were continued until the evening of the 10th, when they were again increased to two and a half drachms, and six grains respectively, and continued until the evening of the 14th, when they were increased to three drachms, and seven grains, and on the evening of the 16th the Arsenic was increased to eight grains. The disease continued to steadily progress during this time, and very little effect was produced upon the temperature.

Cinchona Alkaloids and Arsenic.

Cinchona Alkaloids and Arsenic.

Case No. LXXI.—It was decided in this case to try again the effect of the mixed Cinchona Alkaloids and Arsenic on the hæmatozoon, as it had shown promise of efficacy in that of Horse No. LXV, in which case after a short exhibition of the drugs, the hæmatozoon was kept in subjection for a period of twenty-seven days. Consequently as a fresh trial was resolved upon, the animal was first put upon small doses, beginning with one drachm of the Alkaloids and four grains of Arsenic, given in the form of the Liq: Arsenicalis. On the morning following the first dose, the temperature was found to have fallen over a degree, and the hæmatozoon was absent from the blood, the temperature remained low, and the organism absent for the next five days, during which period two doses of the medicine were administered daily. On reference to the Chart, it will be seen that on the 9th day of the disease the hæmatozoon again appeared in the blood; consequently on the 10th, the doses of Alkaloids and Arsenic were increased to one and a half drachms and five grains respectively; these were continued for a period of eight days, during which time the hæmatozoon varied in numbers between few and very numerous. On the 18th day of the disease a further increase in the doses was agreed upon, and during the next four days, they were put up to Alkaloids two and a half drachms, and Arsenic grains vi, and for the latter half of this period the organism was absent from the blood, but re-appeared on the 22nd day, and remained on the 23rd at few. On the former date the Alkaloids were increased to three drachms, and the Arsenic to grains viij, and from the 23rd to the thirty-fifth day of the disease, on which latter date the animal succumbed, the hæmatozoon was entirely absent from the blood. During the thirty-two days the animal was under treatment, three hundred and fifty-five grains of Arsenic in the form of Liquor Arsenicalis, and one hundred and fifty-four and a half drachms of the mixed Cinchona Alkaloids were administered.

Quinine.—Quinine seems to enter into combination with albumen. It lessens protoplasmic and amœboid movements, and destroys low animal and vegetable organisms. Quinine diminishes and in large doses arrests fermentation. It is a powerful antiseptic, and a dilute solution will preserve meat, milk, butter, or wine for a length of time.

Quinine and the other Cinchona Alkaloids destroy bacteria, their power diminishing in the following order:—Quinine, quinidide, cinchonidine, and lastly cinchonine.

Koch observed that when anthrax bacilli were exposed to the action of a solution of Quinine 1 to 830, the growth of the bacilli was hindered, but that a solution of 1 to 625 prevented their growth altogether.

Case No. LXXII.—This animal belonged to the Bombay Tramway Company. On the morning of the 7th October 1892, the "Surra" hematozoon was discovered on microscopical examination of its blood. On admission to the Laboratory Hospital the following note was made: "Bay Gelding, aged five years, appears to be in perfect health, and in splendid condition." On this day the hæmatozoon was absent from the blood, while for the next two days it was swarming; specific treatment was deferred, a simple febrifuge draught being given to try and reduce the temperature. On the evening of 12th October the organism was only present in small numbers in the blood, and the temperature had decreased considerably, as had also the pulse. It was decided to again attempt the destruction of the hæmatozoon by the exhibition of Cinchona Alkaloids and Arsenic, commencing in this instance with large doses (viz. Alkaloid drs. iij and Arsenic grains iv bis die). The reason why large doses of the former were exhibited was that few hæmatozoa remained in the blood, and in order to decide whether their destruction could be compassed by the drug, the dose was so regulated as to insure its having a fair trial. No marked change took place in the animal's condition, nor in the number of the organisms present, until the 16th instant, when the hæmatozoa became numerous, the temperature rose considerably, respirations were increased in number, and it was noticed that the sheath was swollen; the treatment was continued, the dose of Arsenic having been gradually raised to six grains. On the 17th the organism had again fallen to few, but the temperature and pulse were still above normal. On this date it was decided to try the effect of full doses of Quinine, as this drug has been said to be of much value when exhibited in this manner. Ranking has stated that "by the employment of full doses of Quinine and Arsenic, he has been able to cure the disease. It appeared from our previous experiments on the use of similar drugs, that it would be futile to attempt the destruction of the hæmatozoon by giving only the full medicinal dose, and we considered it to be advisable therefore to commence with a dose of drs. iv of Quinine, and Arsenic grains xii in the 24 hours, carefully watching its effects, and in case of any untoward symptom appearing, to discontinue its use.

At noon on this date therefore drs. iv of Quinine were given, and the horse carefully watched during the day. With the exception of slight dulness no marked symptom followed its use. On the 18th some improvement had taken place, the hæmatozoon was absent from the blood, the temperature had fallen somewhat, as had also the respirations and pulse; five drachms of Quinine alone were given on that day, and no marked symptoms were produced with the exception of an increase in the number of the respirations, which soon passed off. On the 19th contrary to our expectation the hæmatozoon again appeared in the blood in small numbers, but there was no very marked change in the animal's condition. Quinæ Sulph. increased to drs. vi caused no marked disturbance. On the 20th the animal was bright, but the disease was progressing as witnessed by œdema appearing under the abdomen; the same quantity of Quinine and Arsenic were administered as on the 19th. On the 21st petechiæ had appeared on the conjunctival membranes, but otherwise there was little change; medicine continued as before. On the 22nd no change was noticed; the medicine was again repeated. On the following day the animal presented a dull appearance, but not markedly so. Quinine and Arsenic in large doses have apparently produced no amelioration of the animal's condition, nor the slightest effect upon the vitality of the hæmatozoon, which is as active and numerous as before, and it was hence resolved to abandon the experiment, and to return to the use of Cinchona Alkaloids and Arsenic; six drachms of the Alkaloids and twelve grains of Arsenic were given. On the 24th the hæmatozoon had disappeared from the blood, but the disease was progressing; on this day the Arsenic was increased to fourteen grains. On the 25th disease was still progressing, the animal being exceedingly dull, and the œdema increasing. From this date until the morning of the 30th, the medicine consisted of Alkaloids drs. vi, and Arsenic grains xvi per diem, and a gradual improvement in the patient's condition was noted, the œdema on the under-surface of the belly decreasing in amount, and the animal presenting a bright appearance, while the temperature kept slightly above the normal range. On the morning of the 30th the animal was very dull, and the visible mucous membranes were injected, but the œdema was reduced in amount. From the evening of this date the dose of Arsenic was decreased to ten grains during the day. On the morning of the 31st the temperature and the pulse were normal, and remained so throughout the day, but there was no further change. From this date until November 7th, the medicine was given twice daily in the same doses, and improvement in the animal's condition was progressive, so much so that on the 5th and subsequent days the animal appeared to be in perfect health, and it would have been impossible for any one to discover that he was the subject of "Surra". On the morning of the 7th, however, the patient was noticed to be dull, and the temperature at midday was slightly above normal; so the treatment was continued. On the 8th the only change noticed in the morning was the appearance of two petechiæ on the membrana nictitans; the temperature still remaining slightly above normal, and the respirations increased in number. On the 9th animal was dull, the temperature rose steadily throughout the day to 40·3°C., but beyond this there was no apparent change; on the evening of this day the dose of Cinchona Alkaloids was reduced to two and a half drachms, and that of the Arsenic increased to six grains. On the 10th there was little change excepting that the temperature had fallen to 39·3°C. and the respirations to normal; the medicine was continued. On the 11th the condition remained absolutely unchanged. On 12th there was slight improvement, the animal being brighter; treatment discontinued in the evening. On the 13th the animal was somewhat dull, the temperature at midday fell to normal, and only rose slightly in the evening. Medicine was omitted in the morning, and Cinchona Alkaloids two drachms, and Arsenic four grains were given in the evening. On the 14th serious symptoms were noticed, the animal appearing almost somnolent, head hanging, eyes dull and heavy, and the attitude indicative of extreme depression, and œdematous swellings present around the lips and lower part of the nose. The surface of the body was cold, especially at the extremities, the internal temperature and the pulse were subnormal. Stimulants were administered, chiefly Ammonia, and friction carried out over the body and limbs with a view to exciting the circulation. In the evening the temperature and the pulse had slightly risen. The Alkaloids and Arsenic were discontinued. After this date, on account of the animal's state, it was found impossible to continue the experiment.

Biniodide of Mercury.—The double Iodide of Mercury and Potassium. This salt is said to have given great satisfaction as an antiseptic germicide for surgical purposes, a 1 in 4000 solution is equal in activity to a 1 in 1,200 solution of corrosive sublimate, over which it has the very important advantage of being markedly less poisonous.

Iodic : Hydrarg.

Case No. LXXIII.—This animal, an Australian Gelding, aged seven years, belonging to the Bombay Tramway Company, developed fever on the 14th October 1892, after having been in the country exactly six months. The hæmatozoon was discovered on the 30th October. The animal arrived at the Laboratory Hospital on the 31st October, the 2nd day of the disease, and it was deemed advisable to commence treatment at once, as the loss in condition was well marked, and the disease appeared to be progressing. In this case it was decided to try the effect of Iodic : Hydrarg : (the soluble Double Iodide of Mercury and Potassium) which is said to possess the following advantages over Mercuric Perchloride, viz., that the bacteriocidal power of a solution of 1 in 4,000 is equal in activity to a 1 in 1,200 solution of $HgCl_2$ and that it is markedly less poisonous. The salt is also said not to possess the power of precipitating albumen. Consequently on the evening of the 31st October, the hæmatozoon being absent from the blood and the temperature 38·3°C., two grains were administered in half a pint of water ; as the temperature remained low, and the organism still absent from the blood, on the following morning a similar dose to the former was given, followed by three grains in the evening. On the morning of the 2nd of November, the hæmatozoon was again observed in the blood, and three grains were administered with a temperature of 38·1°C., but by the evening the thermometer registered 39·8°C., and attained a maximum on the evening of the 4th, when it registered 40·5°C. During these two days the hæmatozoa were respectively few and numerous in the blood, and nine grains of the drug were given on the former, and twelve on the latter day. On the morning of the 5th the temperature had fallen two points below that of the previous evening, and by midday registered 40°C. The hæmatozoon was absent from the blood, and eleven grains were given during the day. On the morning of the 6th the temperature was 37°C., having dropped 3°C. since noon on the 5th, but again rose to 38·7°C. by 5 P.M. the same evening. From this date until the evening of the 12th there was continued fever, the highest temperature recorded being 40·5°C., but the hæmatozoon continued to be absent from the blood, this being the eighth day in succession. During this period seventy grains of the drug were administered, made up of four doses of four grains, and nine doses of six grains. On the morning of the 13th the temperature had fallen to 38·4°C., and during this and the following day it remained low, and the hæmatozoon was absent from the blood ; the animal in the meanwhile received eighteen grains of Iodic-Hydrarg. On the 15th the hæmatozoon re-appeared in the blood, and the temperature, which at 8 A.M. registered 38·2°C., began to rise, but did not reach a maximum until the evening of the 16th, when it was 41·7°C. As up to this time 154 grains had been administered, without any apparent effect on keeping down the temperature, or, reducing the number of hæmatozoa, which at this time were numerous in the blood, Quinæ Sulph. three drachms, were administered. On the morning of the 17th the thermometer registered 39°C., a fall of 2·7°C. in the night, and the organism was found absent from the blood. From this date until the evening of the 21st the temperature fell, and remained more or less within the normal limit ; at the same time the hæmatozoon was absent from the blood. Nine drachms of Quinine and 55 grains of Iodic. Hydrarg. were administered.

By the evening of the 22nd the thermometer registered 40·8°C. The hæmatozoa had again appeared and were numerous in the general circulation, and as up to 9 A.M. on this date 214 grains of Iodic. Hydrarg. had been given since the 31st October, without producing any marked effect on the hæmatozoon, and none at all on the temperature, it was deemed advisable to substitute Arsenic for this drug ; at the same time it was fully recognized that the disease having now been present for 24 days, the death of the animal was almost certain, and was simply a matter of time. At 6 P. M. the animal received Liq : Arsenicalis ʒx, equivalent to gr. v, and by the following morning the temperature had fallen to 39·5°C. The dose was increased on the evening of the 23rd to gr. vi, and remained at that until the evening of the 25th, when owing to the temperature registering 40°C, and the organism still being numerous in the blood, the dose of Arsenic was again increased to gr. vii. On the morning of the 26th the temperature was 38·7°C., P. 60, R. 12 ; the hæmatozoon was absent from the blood, and the animal brighter in appearance. The temperature registered 38°C. on the morning of the 27th, P. 48, R. 12. From this date until February 17th, 1893, on which the animal died, the treatment was continued, and the hæmatozoon remained absent from the blood.

Case No. LXXIV.—This animal, a Grey Arab Gelding, No. 492, aged 14 years, belonging to the Bombay Tramway Company, was recognized as ailing on the 14th October, 1892, after having been in the country for a period of four years.

Santonin.

Iodic: Hydrarg.

Liq. Arsenicalis.

On the same date it was taken into the Infirmary suffering from debility, and had fever off and on until November 7th, when the hæmatozoon was discovered. There was a temperature of 40·8°C. on the 27th October, and there is little doubt that the organism was present in the blood at a date considerably anterior to that on which it was found. The animal arrived at the Laboratory Hospital on the morning of the 9th November, the twenty-seventh day of the disease. In this case it was decided to try the effect of Santonin: consequently on the evening of the 10th the organisms being few in the blood, and the temperature 38·5°C., thirty grains were administered, and a similar dose was repeated on the 11th, followed by Ol. Lini: Oj. on the morning of the 12th, but in the meanwhile the temperature had attained 41°C., the hæmatozoa were very numerous in the blood, and the visible mucous membranes were stained a bright yellow in colour. The oil produced three movements of the bowels in the first six hours, but the fæces were formed, and no symptoms of diarrhœa supervened that evening. On the following day the evacuations were of a semi-fluid character, the temperature had fallen 2·8°C. since the previous evening, the hæmatozoa were numerous in the blood, and the disease was progressive. As on the 14th the diarrhœa continued, one and a half ounces of Tinct: Opii were given, which checked it during the day. The same evening, however, the temperature again became elevated 40·8°C., and on the following morning the hæmatozoa were found to be very numerous in the blood; but Quinæ: Sulph: ʒiij reduced the temperature to 39°C., and the hæmatozoa disappeared. As the Santonin had no action on the hæmatozoon, it was decided to again give the double Iodide of Potassium and Mercury a trial. Two doses of four grains each were given on the 16th, and the doses were increased to six on the seventeenth, but as the temperature showed signs of again becoming elevated a drachm of Quinine was administered in the evening, which reduced the temperature on the morning of the 18th to 37·6°C. and the organism still remained absent. The same dose was repeated twice during the day. From the 19th to the evening of the 21st the drug was persisted in. The temperature on the evening of the latter date had gradually risen to 40·3°C., and the hæmatozoa had increased from few to numerous in the blood, whilst the urine contained, on the former date, one-ninth part of albumen, together with numerous granular casts. Three drachms of Quinine were therefore given to reduce the temperature, but as no alteration in it had taken place on the morning of the 22nd, it was decided to subject the animal to a treatment of Arsenic alone, simply giving the dose in the form of Liq: Arsenicalis in the drinking water. After the first dose the temperature fell to 40°C., but at the time when the second dose was given, it had again risen to 40·8°C.

On the morning of the 23rd, the thermometer registered 39·4°C. in the rectum, the dose of Arsenic was increased to six grains twice daily, and by the same evening the temperature had fallen to 39·1°C. On the morning of the 25th, the temperature was 36·5°C. and the organisms had been absent from the blood for three days, but the former suddenly rose to 39·4°C. at the time of the midday observation, but fell to 37·8°C. the same evening. On the morning of the 27th the hæmatozoon having been absent for four days, again made its appearance with a temperature within normal limits, but from that date until midday on the 9th December the dose of Arsenic grs. xii per diem was continued, and the temperature although oscillating did not exceed 38·4°C. and the hæmatozoon which had disappeard from the blood by the morning of the 28th November, remained absent. On the evening of the 9th December the temperature rose one point, and on the following morning it was two degrees lower, but rose again to 39·3°C. by five P.M. This was the maximum recorded during the four days previous to death, which occurred on the morning of the 15th December, the sixty-third day of the disease. At the time of death the hæmatozoon had been absent from the blood for a period of eighteen days.

Potass (*KHO*).—This is a protoplasmic poison, destroying muscle, nerves and nerve centres, when applied to them for a sufficiently lengthened period and in a concentrated form.

It does not paralyse the *heart* when given by the mouth, but when injected directly into the veins, it produces transitory excitement, clonic spasms, paralysis and death. Large doses cause a rapid fall of blood pressure and pulse rate. Smaller doses cause a slight fall of both pulse-rate and pressure, followed by a rise of both. Large doses are irritant, corrosive, and cardial sedatives, medicinal doses are antacid, febrifuge and diuretic.

Liq. Potassæ.

Case No. LXXVI.—This animal, 11 years of age, four years in the country, suffered from fever on 8th November 1892. The Surra hæmatozoon was discovered in the blood on the 25th instant, and the animal was received at the Laboratory Hospital on the following day. On its admission, the temperature was 39·2C., P. 72, R. 12, and the blood contained a few organisms. In this case it was determined to try the effect of Liq. Potassæ in large doses on the hæmatozoon, and as the temperature rose the same evening to 40°C. a dose of ʒiv was administered. On the morning of the 27th the temperature was 39·1°C., P. 76, R. 20, and the hæmatozoon absent from the blood, but by evening the temperature had again risen to 39·7°C., P. 80, R. 34; nine drachms of Liq. Potassæ were given during the twenty-four hours. By the 28th, temperature, pulse and respirations had all fallen considerably, but the organism had again made its appearance in the blood. The urine was found to contain in addition to albumen $\frac{1}{22}$nd, and casts, a trace of bile and bile acids. At five P.M. the Temp. was 40·2°C., P. 72, R. 24. Three doses of medicine were administered during the day. On the morning of the 29th, the animal presented a dull appearance, and there was a slight mucous discharge from the nostrils; the temperature had fallen a degree during the night, but the pulse was dicrotic, and registered the same as on the previous evening, and the hæmatozoa were few in the blood. Three doses of the medicine were repeated. On the 30th, the animal again presented a dull appearance; the visible mucous membranes were clean, but the conjunctivæ petechiated; there was also considerable œdema of the extremities especially of the hind limbs, and the sheath presented the same condition, but to a more limited extent. Temp. A.M. 39·3°C., P. 72, R. 20. Hæmatozoa few in the blood. Three doses of medicine were repeated. December *1st*.—The animal looked brighter, but the disease continued to progress; the visible mucous membranes were tinged yellow, and the left conjunctiva invaded by five large petechiæ. The pulse was regular, but the beat forcible, and jugular regurgitation was present. The hæmatozoon, however, was still present in the blood, and the œdema of the sheath and extremities had increased in amount. Owing to the presence of a denuded patch on the floor of the mouth, from which the mucous membrane had been accidentally removed whilst administering the medicine, it was decided to omit any further doses of Liq. Potassæ until the abrasion had healed. Up to this time, the animal had received sixty-three drachms of Liq. Potassæ in thirteen doses equivalent to about 220 grains of Hydrate of Potassium. The disease had continued to progress during the administration of this chemical, but it had in no way disarranged the organs of digestion, for the appetite was noted on this date as excellent. On the other hand, the albumen in the urine had steadily increased in amount during its exhibition, but it is difficult to say to what extent, if any, the increase of albumen was due to the large doses of Potash.

On December 2nd, the temperature was 39·4°C., P. 72, R. 20, the hæmatozoa had increased, and were now numerous in the blood, but the general condition of the animal was unchanged. On the morning of the 3rd, the temperature maintained the degree registered on the previous evening, pulse 68, but the respirations had fallen to 16 per minute and the organisms were still numerous in the blood. The pulse beat was forcible and quick but regular. The œdema of the under-surface of the abdomen had extended forward, and the albumen in the urine had attained to $\frac{1}{3}$rd; in addition there were numerous blood and epithelial casts, and a few pus cells. On experimentation the re-action for bile pigment was well marked. In consequence of the unsatisfactory condition presented by the animal, it was decided not to recommence the administration of the Liq. Potassæ, but to substitute Arsenic for it, commencing with the full physiological dose of four grains, to be repeated once in the twenty-four hours.

Arsenic.

On the evening of the 3rd December, Temp. being 39·4°C., P. 72, R. 20, the first dose of grains iv, was given after the evening meal in the drinking water in the form of Liquor Arsenicalis. On the following morning the temperature was 39·2°C., the pulse remained as before, but the respirations had increased to 24 per minute. The hæmatozoa were few in the blood. The same dose of Arsenic was continued, making eight grains in all. On the morning of the 5th the temperature had fallen to 38·2°C., the pulse to 64, Respirations 20, but the animal presented a dull appearance, and the general symptoms of the disease were intensified, but still the appetite remained excellent. There were a few hæmatozoa in the blood. At 5 P.M. the same evening the pulse had again increased in frequency, and registered 76 per minute. Temp. 39°C. R. 24. Ten grains of Arsenic were given during the day. On the morning of the 6th, the temperature had fallen half a degree, P. 64, R. 12., but the hæmatozoa were very numerous in the blood. The same dose of Arsenic was continued. By the following morning the temperature had again fallen a degree, but the organism was still present in the blood, although in small numbers. The animal continued to present a dull and semi-somnolent appearance, and the œdema had increased in amount between the fore-legs. In the evening the thermometer registered two-thirds of a degree above the morning observation. Arsenic increased to grains vi, bis die. During the following night the temperature fell, and at 8 A.M. registered 37°C. in the rectum; the pulse was 60, R. 12. There were a few hæmatozoa in the blood, but the appearance of the animal was brighter, and the œdema on the under-surface of the abdomen was slightly reduced in amount. The temperature, however, again rose in the evening, a little over a degree, and registered 38°C. on the morning of the 9th, the pulse being 60, and respirations 12, but the hæmatozoon was absent from the blood. It will thus be observed on reference to the Chart, that five days and a half had elapsed since the commencement of the Arsenical treatment, and during that period fifty-six grains had been given in the drinking water. For the next two days the dose was increased to fourteen grains per diem, in order to try and effect the destruction of any miniature forms of the organism, which might be present in the blood. The temperature on the morning of the second day registered 36·5°C., the animal presented a brighter appearance, and some further absorption of the exudation on the under-surface of the abdomen had taken place, although that of the limbs continued unabated.

During the period which elapsed between the 11th of December 1892, and the 4th of January 1893, the Arsenical treatment was continued; the Surra hæmatozoon was absent from the blood. The maximum dose of grains vii, was again exhibited on the 14th and 15th December, but from the latter date it was gradually reduced by one grain at a time, until the minimum of grains iii, was reached on the 3rd January. On the 16th December, the animal commenced to lose flesh rapidly, although previous to that date it had become to a certain extent emaciated within the limits of health. From this date, however, in spite of the amount of food consumed, progressive atrophy of the muscles set in, especially along either side of the spinal column and those surrounding the hip-joints and buttocks. The œdema of the extremities and under-surface of the abdomen entirely disappeared, and as before mentioned the girth of the animal's body just in a line with the sheath measured only 57 inches. No doubt, this can be readily accounted for by the condition of the kidneys, for during a period of nearly five weeks, a large amount of albumen was found in the urine, varying between $\frac{1}{4}$ and $\frac{1}{22}$, and on one occasion as low as $\frac{1}{40}$. Blood, epithelial and granular casts were present for the first eighteen days of the disease, and were followed by hæmaturia, varying in amount for twenty days, during which period no casts or crystals were discovered in the urine.

From the evening of the 3rd December 1892, until the evening of the 3rd of January 1893, three hundred and one grains ot Arsenic, in the form of Liq. Arsenicalis were given in the drinking water, and the hæmatozoon was absent from the blood for a period of twenty-seven days.

Case No. LXXVII.—This animal, a Persian Gelding, aged 13 years, was admitted into the Laboratory Hospital on the 29th November 1892, the third day of the disease, with a temperature of 39·2°C., which by midday had risen to 40·3°C., but again fell in the evening to 39·1°C., P. 56, R. 28. At 5-30 P.M. an eruption of Urticaria appeared, which gradually faded as the night advanced. Treatment was commenced on the morning of November 30th, the fourth day of the disease, when Arsenic gr. iv. bis die, was prescribed. The urticarial eruption recurred each morning but daily faded towards night, until December 3rd, the 7th day of the disease. On this latter date the hæmatozoa, which had been present for the six previous days, disappeared from the blood, but this was most probably only a phase of the disease, and simply the commencement of a natural intermission, and not the effect of the twenty-six grains of Arsenic, which had been given in the drinking water up to date. The dose of the chemical was now increased to gr. vi. bis die, and was continued for two days, after which it was decreased to gr. v. After an absence of three days, during which the temperature oscillated between 39·3°C. and 37·4°C., P. 56 to 44, R. 20 to 12, the hæmatozoon re-appeared in the blood, and a few were observed during the 10th and 11th days of the disease. This, however, proved only an abortive attempt on the part of the organism to return, for on the following day it was absent from the blood, thus proving that the Arsenic was producing some effect. On the latter date, the dose was again increased to gr. vi, and this was maintained until the evening of the 25th day of the disease. On the 26th and 27th days it was decreased to gr. v, on the 28th day to gr. iv, from the 29th to 31st gr. iijss, and from the 32nd to the 36th day inclusive, doses of gr. iij were given. After this, the evening dose on the latter, and the morning dose on the 37th day were omitted, owing to the animal presenting a somewhat dull appearance, but the same dose was repeated on the evening of the 37th day.

Arsenic.

Up to this time the hæmatozoon had been absent from the blood for twenty-six days, and during this period the temperature had for the greater part of the time been below 38°C., but on the 35th day it became slightly elevated, the maximum registered being 38·7°C. From the commencement of the treatment, 319 grains of Arsenic had been given in the drinking water in 34 days, in doses varying from gr. iij to gr. vi bis die.

On the morning of January 3rd, 1893, the 38th day of the disease, the hæmatozoon again made its re-appearance in the blood, and although absent on the following morning was again present on the two following days—the 40th and 41st. On the latter date the temperature reached 40·1°C. at midday, the pulse and respirations however remained within normal limits, but at 5-30 P.M. a fairly well marked eruption of Urticaria appeared over the neck, shoulders, and was especially well marked over the inner side of the thighs and perineal region; but it had completely faded on the morning of the following day.

From the 42nd, to the evening of the 56th day of the disease, the organism was again absent from the blood; the temperature oscillated between 40°C. and 37·8°C., the pulse and respirations varying but little in frequency, and always keeping within the normal limits. From the morning of the 38th to the evening of the 56th day, 200 grains of Arsenic were given to the animal, in doses varying between grs. iij to grs. vi ss bis die, but no bad symptoms of any kind were observed, which could be attributed to the effect of the chemical.

The dull appearance presented by the animal on the morning of the 56th day, persisted on the 57th day, and the hæmatozoon was found in the blood on microscopical examination. A dose of Arsenic gr. v was given, but on the 58th day the animal drank no water, so the medicine was omitted. But the same evening, in consequence of the temperature having risen to 39·1°C., Quinæ Sulph : ʒiiss were administered by the mouth.

Fresh symptoms were noted on the morning of the 59th day, in that the mucous membranes were coloured yellow, large bright-red petechiæ invaded both membranæ nictitantes, and excessive lachrymation was present, the pulse being full and hard. On the 61st day the symptoms were more pronounced, and slight weakness was observed on the right side of the body, the appetite completely failing. These symptoms were accentuated on the following day, when the hæmatozoa were very numerous in the blood, and the animal had some difficulty in standing. From this time it gradually got worse, and Chloroform was administered at 12-30 P.M. on the 66th day of the disease, death taking place at 12-37 P.M.

During the last paroxysm Arsenic was only given on three days and a half out of ten, and for the last five days milk only was administered to the animal.

From first to last, the treatment, which was commenced on the morning of the 4th day, and terminated on the evening of the 61st day of the disease, consisted of Arsenic, with one exception, when Quinine was administered to reduce the temperature. In all 554 grains of Arsenic were given.

Arsenic.

Case No. LXXVIII.—The symptoms of 'Surra' were well marked in this animal on its arrival at the Laboratory Hospital, as evidenced by the yellow colouration of the membranes, the œdema of the extremities, and the presence of swarms of the Trypanosoma in the blood. It was decided to immediately commence treatment, and as in previous experiments the irritating effect of the mixed Cinchona Alkaloids had been recognized, when in conjunction with Arsenic, it was now determined to administer the latter drug alone. On the evening of the 7th December, four grains of Arsenic in the form of Liq. Arsenicalis P. B. were given in the drinking water, the temperature being 39°C., P. 52, R. 32. On the morning of the 8th the temperature had fallen half a degree C. Pulse continued the same, but the respirations had fallen to 20; but the same evening all three had again become elevated, Temp. 39·5°C., P. 60, R. 32. Two doses of four grains each were given during the twenty-four hours. On the morning of the 9th, the organisms had decreased in number in the blood, and were now few, and the respirations were just one-half, viz. 16. But the same evening although the temperature and pulse remained about the same, the respirations rose to 36. The dose of Arsenic was increased to five grains twice daily. On the 10th the temperature had fallen to 38·3°C., P. 52, R. 16, but the organisms were numerous in the blood, and the P. M. temperature was 40·1°C., P. 60, R. 16. Arsenic repeated. On the 11th the temperature had fallen to 39·2°C. P. 56, R. 16, and the hæmatozoon was absent from the blood. From this date until death, on the morning of the 18th, the organisms remained absent, and the dose of Arsenic was maintained at six grains twice daily. Nevertheless the temperature rose on the evening of the 11th to 41°C., and attained the same degree on the following night, without any apparent cause, but gradually fell, reaching a minimum of 38·5°C. at mid-day on the 14th. On the morning of the 15th the animal developed a cough, and from that date until mid-day on the 17th, the temperature oscillated between 39°C. and 40·3°C., and then gradually became elevated a few hours previous to death, which was accelerated by a double Pleuro-pneumonia.

Arsenic.

Case No. LXXIX.—On admission to the Laboratory Hospital, on the morning of the 7th December 1892, the animal presented advanced symptoms of the disease, viz., a heavy, dull, and semi-somnolent appearance, head hanging, eyes half closed, coat staring, considerable swelling and œdema of the extremities, sheath and under-surface of the abdomen. The urine was acid, and almost solid, owing to the presence of albumen; the hæmatozoa were at the same time swarming in the blood. Temperature 5 P.M. 41·3°C., P. 68, R. 24.

With such an array of serious symptoms, it was difficult to know what treatment to adopt, but recognizing the fact that death must inevitably ensue in a short period, if these symptoms were not checked, it behoved one to select a drug which would, if possible, destroy the hæmatozoon with as little delay as possible, and at the same time cause a minimum amount of irritation to the renal structures. The choice lay between *Quinine, Mercury and Arsenic.*

The former we have seen was not to be relied upon; even when such large doses as six drachms were administered, and at the same time it produces an irritating effect upon the urinary passages. Mercury is believed to aggravate inflammation of the lobules, more especially when the renal function is impaired; and moreover a lowering treatment is inadmissible.

Arsenic on the other hand is not known to affect the kidney specially, although it is eliminated chiefly by this organ; and in addition, it is sometimes used in Bright's disease. Consequently at 6 P. M., the minimum physiological dose of Arsenic, grains iv, in the form of Liq. Arsenicalis, was given to the animal immediately after the evening meal. On the following morning, the 8th, the temperature had fallen over two degrees Centigrade, the organisms were less numerous in the blood, but the pulse and respirations were only slightly reduced in frequency, and the amount of albumen remained stationary in the urine. The same evening the temperature again became elevated 40·5°C., P. 72, R. 33. Two doses of the medicine were administered. On the morning of the 9th the thermometer registered 39·6°C. in the rectum, P. 60, and the respirations had become reduced to 16 in the minute.

The hæmatozoa had also become greatly reduced in numbers, and were now few in the blood, but again the albumen was present in the urine in such quantity, that on boiling, &c. the fluid became almost solid. By midday the temperature had again risen, and registered 40·6°C., and by 5 P.M. was 41·3°C., P. 72, R. 20. In the morning the dose had been increased to Arsenic grains v. and in the evening was again increased by one grain. Early on the morning of the 10th, the temperature was found to have fallen to 37°C., 4·3°C., (7·7°F.) during the night. The pulse now registered 44, and the respirations 12, and the hæmatozoon was found to be absent from the blood. At the same time the albumen in the urine was found to have been reduced to $\frac{1}{4}$. It will thus be seen that from the first exhibition of the drug to the animal, until the disappearance of the hæmatozoon from the general circulation, five doses of the drug had been given, with a total of twenty-three grains. But it must not be forgotten that in the natural course of events, the paroxysm would, in all probability, have lasted only five or six days if untreated; therefore all that we may claim to have accomplished is, to have shortened the period during which the organism was present in the blood. But from this date until the 22nd December, when death took place, a period of thirteen days, the hæmatozoon remained absent from the blood. In an untreated case, after an intermission lasting from one to three days, a second paroxysm usually occurs, and on reference to the records of temperature, it will be seen, that on the day a return of the organism to the blood would most likely occur, the morning record was 38·2°C.; but by the evening it had attained a maximum of 40·3°C., P. 64, R. 16. On the following morning it had again fallen two degrees C., but no sign of the hæmatozoon was found on microscopical examination of the blood, on this or on any subsequent occasion.

To what extent the treatment operated in prolonging the life of the animal, it is impossible to say; but it would appear probable that (i) by bringing down the temperature for some days to within normal limits, (ii) by removing the irritation from the general circulation and so from the nervous system, and lastly (iii) by reducing considerably the amount of albumen excreted to $\frac{1}{9}$th, on the 17th December, a beneficial effect was produced, and by this means the fatal termination was delayed for a short period.

Arsenic.

Case No.—LXXX.—On admission this animal presented unmistakable symptoms of somewhat advanced Surra, as evidenced by the presence of œdema between the fore limbs, extensive conjunctival petechiæ, and a yellow tinge of the visible mucous membranes. There was also a slight eruption of Urticaria invading the neck, belly, and hind limbs. It was again decided in this case to try the effect of Arsenic upon the hæmatozoon, commencing the treatment with the full physiological dose (grs. iv), and gradually to increase the amount of the drug as long as there was tolerance of it. Consequently on the evening of the day of admission—December 11th, 1892—the animal's temperature at that time registering 40·4°C., P. 76, R. 28, with very numerous hæmatozoa present, the first dose was given in half a bucket-full of water. On the morning of the 12th the temperature had fallen to 39·2°C., P. 48, Rs. 16, and the hæmatozoa were found to be few in the blood; the animal however presented a somewhat dull appearance, but all signs of the eruption had disappeared. By the following morning the patient appeared brighter, the temperature had again fallen, and was 38·2°C., P. 40, Rs. 16, and by the same evening the former had become still further reduced, and registered 37·7°C., the hæmatozoon at the same time being absent from the general circulation. Up to this time only three doses, or twelve grains of Arsenic had been exhibited. On the 14th, the dose of the drug was increased to gr. v, and no further symptoms were observed until the morning of the 16th, when although the animal had improved in appearance, fresh and extensive conjunctival petechiæ, bright red in colour, were noticed, the pulse was markedly dicrotonus, and the œdema had increased a little in amount. On the 19th, the dose of Arsenic was increased to gr. vi, and was persisted in until the morning of the 22nd, when it was again reduced to gr. v. as the animal had improved in condition, and the œdema of the belly and legs had decreased in amount. By the following morning all signs of the conjunctival petechiæ had faded, and only a trace of the œdema was left. Fresh petechiæ however appeared on the conjunctivæ on the 27th instant, but the treatment was persisted in, and the same dose of Arsenic exhibited until the morning of the 30th, when it was again reduced to gr. iv, and on the following morning as the petechiæ had again faded, the dose was still further reduced to gr. iii, twice daily. On the evening of January 1st and morning of the 2nd, the medicine was omitted, but was again given on the evening of the latter date, and increased to gr. iv on the 3rd. The animal was found to have lost in condition on the 4th, the mucous membranes were tinged yellow, a fresh crop of petechiæ was present on the conjunctivæ, and a small patch of œdema, the size of the palm of the hand was apparent on the right side of the chest. The dose of the drug was again increased to gr. v on the morning of the 6th, and maintained, nothing of importance occurring until the evening of he 18th, when the temperature was found to register 39°C., P. 68, R. 12, and on the following morning the animal appeared to have lost in condition, a fresh crop of petechiæ invaded the membranæ nictitantes, and there was a slight watery discharge from the nostrils accompanied by cough, and a small swelling was discovered, painful on pressure, over the left orbit. By midday on the 19th, the temperature was 39·7°C., but during the following night fell to 37·3°C., the swelling over the left eye had increased in size. Three doses of Arsenic making gr. xiv in all were given on the latter date, but notwithstanding the temperature continued to rise until 5 P.M., when it registered 39·8°C., and attained a maximum of 40·1°C. at midday on the 21st, on which day the Arsenic was increased to gr. vss. per dose. The abscess burst in the night, and early on the morning of the 22nd a further quantity of pus was evacuated, and the temperature fell to 38·1°C., but the respirations increased to 20 per minute, the pulse being 64. On the 24th, the animal presented a dull appearance, the ordinary symptoms of the disease were present, and in addition there was swelling and œdema of the right hind limb, but it was not painful on manipulation. The pulse was small and frequent—88, but the breathing tranquil, respirations 12—and the appetite was good. Temp. 38·8°C. and the hæmatozoon absent from the blood. The urine however for the first time during the duration of the disease contained albumen, $\frac{1}{7}$th. Death took place on the 25th January, at 7-45 A.M. During the exhibition of Arsenic in this case, 427 grains were given, and the hæmatozoon was absent from the blood on 44 consecutive days.

Case No. LXXXI.—A Grey Herati Mare, aged 9 years. *On admission* it was in very good condition, but on examination presented some symptoms of Surra, and the hæmatozoon was present in small numbers in the blood.

Arsenic.

This animal proved most intractable, to a treatment consisting of Arsenic in the form of Liq: Arsenicalis, which was given in full physiological doses at first, and gradually increased or diminished, according to the condition and symptoms exhibited.

Treatment was commenced on the morning of the sixth day of the disease, the hæmatozoa at that time being numerous in the blood. The first intermission occurred on the 8th day of the disease, after sixteen grains of Arsenic had been taken by the animal, and was a natural phase of the disease, and in no way attributable to the action of the chemical. The second paroxysm lasted three days, 9th, 10th and 11th, during which period the hæmatozoon was present in small numbers in the blood. On the evening of the last-mentioned day, the animal passed some ounces of urine of a dark red colour, which on microscopical examination was found to contain only a very few blood casts, and free red corpuscles. This was however the commencement of a period lasting six days, during which the urine was found to contain albumen, varying in quantity from a trace to $\frac{1}{5}$th, together with enormous numbers of casts, from narrow, medium to the broad uriniferous tubes, which were for the most part granular in character, although a few blood casts were observed. The dose of Arsenic during the presence of the albumen was decreased gradually, until on the evening of the 15th day, and morning of the 16th, none was given. As, however, the hæmatozoon again made its appearance, constituting the commencement of the third paroxysm, the former dose was repeated, and for the next four days during which the paroxysm lasted, was continued, making a total for that period of 39 grains.

The third intermission lasted one day, the 21st of the disease, on which the animal received Arsenic gr. x.

The fourth paroxysm lasted six days, and 31 grains of Arsenic were given.

The fourth intermission extended from the 28th to the 32nd day inclusive, and as this was considered to be a favourable opportunity of placing the animal under the effects of the chemical, the doses were increased; consequently it received 64 grains of Arsenic.

Notwithstanding the before-mentioned daily increase of the dose from xi to xiv grains, a fifth paroxysm occurred on the 33rd day of the disease, lasting 5 days, during which period the hæmatozoa increased to very numerous in the blood. Only 30 grains were given on the first two days, as on the remaining three the animal refused water.

A fifth intermission lasted one day, the 38th of the disease, on which x grains of Arsenic were given. And finally a sixth paroxysm occurred lasting from the 39th to the 41st, both days inclusive. Only x grains were given, owing to the condition of the animal.

Death took place on the 1st day of the 6th intermission, or 42nd day of the disease.

Case No. LXXXII.—On the morning of December 23rd, 1892, the sixth day of the disease, Temp. 39·3°C., P. 64, R. 20, hæmatozoa few in the blood, the animal was subjected to an Arsenical treatment, consisting of grs. iv, in the form of Liquor Arsenicalis P. B. minus the Tinct: Lavandulæ Co. As in the previous cases, the medicine was not administered, but placed in the animal's drinking water at 8 A.M. and 6 P.M. The evening temperature after the first dose, attained a maximum of 40·6°C., P. 64, R. 28. On the morning of the 8th day of the disease, after the animal had received Arsenic grs. xvi, the temperature was found to have fallen to 38·4°C. and the hæmatozoon was absent from the blood. On the 9th day the temperature registered only 37·8°C. From this date until the 62nd day of the disease, when the treatment was discontinued, the temperature only on one occasion reached 39°C., viz., on the evening of the

Arsenic.

42nd day. Notwithstanding that the animal's appetite continued to be very good, and that the condition was fairly maintained, it was decided to abandon the treatment for the following reasons :—

(i) Because 525 grains of Arsenic had already been taken by the animal.

(ii) In order to test the efficacy of the treatment, and so encourage the return of the Surra hæmatozoon in the blood, if still present in the body tissues, two Guinea-pigs were inoculated with 0·5 c. c. of blood taken from the Jugular Vein on the 17th February 1893, just after the last dose of Arsenic was taken by the animal.

(iii) In some cases the abrupt discontinuation of Arsenic appeared to be followed in the animal by a rapid waste of tissue, and this was deemed a good opportunity for making an observation. On the morning of the 20th February, the third day after discontinuing the Arsenical treatment, the animal presented a dull appearance, the abdomen was tucked up, and the appetite had somewhat fallen off. The swelling and œdema of the extremities, which had completely disappeared, now returned in the fetlocks.

Arsenic.

Case No. LXXXIV.—This animal was placed upon a treatment of Arsenic, the dose consisting of gr. iv. bis die. in the form of Liq: Arsenicalis, which was gradually increased until it reached gr. v. The hæmatozoon which was absent from the blood on the morning of the first exhibition of the metal, continued so for a period of eleven days, including the six during which fifty-five grains of Arsenic were administered, and the five following days. The organism re-appeared in the blood on the 12th day, and death occurred two days later. From first to last the course of the disease occupied 18 days.

No. XVII.—*Table of Treatment.*

Horse Number.	Treatment.	How administered.	Minimum dose.	Maximum dose.	Total quantity of each drug administered in		Date From—To under each form of Treatment.	Number of days under form of Treatment.	Date of disappearance of hæmatozoa from the blood.	Date of re-appearance of hæmatozoa in the blood.	Number of days hæmatozoa absent.	Result of Treatment.	Number of days which elapsed between the first appearance of disease and death.	Number of days under Treatment for Surra.
					Grains.	Grammes.								
VI	Hydrargyri Perchloride ...	Subcutaneously injected ...	2·3 grains, 0·15 grammes ...	10·8 grains, 0·7 grammes ...	40·1	2·60	3 12 90 8 12 90	6	2 12 90	5 12 90	3	Nil ...	44	16
	Iodine ...	Injected into Trachea ...	1·8 grains, 0·11 grammes ..	5·5 grains, 0·35 grammes ...	37·49	2·43	9 12 90 18 12 90	10	13 12 90	14 12 90	1	Death ...		
	Potassium Iodide ...		8·8 grains, 0·56 grammes ...	26·5 grains, 1·7 grammes ...	187·49	12·15								
VIII	Iodoform in Æther...	Subcutaneously injected ...	3 grains, 0·19 grammes ...	4 grains, 0·25 grammes ...	7	0·45	30 12 90 31 12 90	2	28 12 90	31 12 90	3	Nil ...	18	6
	Do. ...	Injected into Jugular Vein.	5 grains, 0·32 grammes ...	25 grains, 0·16 grammes ...	44	2·85	1 1 91 3 1 91	3	......	......	...	Nil ...		
	Hydrargyri Perchloride ...	Do. ...	9·25 grains, 0·6 grammes ...	9·25 grains, 0·6 grammes ...	9·25	0 6	4 1 91	1	......	......	...	Death ...		
XIV	Oleum Terebinthinæ ...	Subcutaneously injected...	8 c.c.	8 c c.	...	...	9 2 91	1	......	......	...	Nil ...	21	5
	Do. ...	Injected into Jugular Vein.	8 c.c.	8 c.c.	...	...	10 2 91	1	......	......	...	Nil ...		
	Do. ...	Injected into Trachea ...	8 c.c.	12 c.c.	...	...	14 2 91 16 2 91	3	......	......	...	Death ...		
XV	Potass Bichromate...	Injected into Jugular Vein.	5 grains, 0·32 grammes ...	11 grains, 0·71 grammes ...	23·5	1·52	7 2 91 10 2 91	4	......	......	...	Nil ...	35	20
	Do. ...	Gastric Ingestion ...	40 grains, 2·59 grammes ...	180 grains, 11·65 grammes .	2,378·5	154·12	13 2 91 28 2 91	16	22 2 91 27 2 91	24 2 91 4 3 91	2 5	Death...		
LXV	Mixed Cinchona Alkaloids ...	Do. ...	30 grains, 1·94 grammes ...	180 grains, 11·65 grammes .	7,680	497·66	14 6 92 9 7 92	26	20 6 92	17 7 92	27	Nil ...	67	29
	Arsenic ...		4 grains, 0·25 grammes ...	12 grains, 0·77 grammes ...	427	27·6	17 7 92 19 7 92	3	21 7 92	......	9	Death ...		
LXX	Acid: Carbolic ...	Do. ...	60 grains, 3·88 grammes ...	120 grains, 7·77 grammes ...	4,560	295·48	25 9 92 30 9 92	6	27 9 92 1 10 92	28 9 92 4 10 92	1 3	Nil ...	26	21
	Iodine ...		30 grains, 1·94 grammes ...	30 grains, 1·94 grammes ...	2,070	134·13								
	Mixed Cinchona Alkaloids ...	Do. ...	90 grains, 5·83 grammes ...	180 grains, 11·65 grammes .	4,230	274·10	4 10 92 18 10 92	15	8 10 92 16 10 92	10 10 92	2 4	Death...		
	Arsenic ...		5 grains, 0·32 grammes ...	8 grains, 0·51 grammes ...	181	11·08								
LXXI	Mixed Cinchona Alkaloids ...	Do. ...	60 grains, 3·88 grammes ...	180 grains, 11·65 grammes.	7,920	513·21	25 9 92 26 10 92	32	26 9 92 12 10 92 16 10 92	1 10 92 14 10 92	5 2 12	Death...	34	32
	Arsenic ...		4 grains, 0·25 grammes ...	7 grains, 0·45 grammes ...	355	23·004								
LXXII	Mixed Cinchona Alkaloids ...	Do. ...	180 grains, 11·65 grammes .	180 grains, 11·65 grammes .	1,620	104·97	12 10 92 16 10 92	5	......	......	...	Nil ...	45	34
	Arsenic ...		4 grains, 0·25 grammes ...	6 grains, 0·38 grammes ...	44	2·85								
	Quinæ: Sulphate ...	Do. ...	240 grains, 15·55 grammes.	360 grains, 23·32 grammes.	1,980	128·3	17 10 92 22 10 92	6	18 10 92	19 10 92	1	Nil ...		
	Arsenic ...		6 grains, 0·38 grammes ...	6 grains, 0·38 grammes ...	72	4·66								
	Mixed Cinchona Alkaloids ...	Do. ...	120 grains, 7·77 grammes ...	180 grains, 11·65 grammes .	6,780	439·34	23 10 92 14 11 92	23	24 10 92	19 11 92	26	Death ...		
	Arsenic ...		4 grains, 0·25 grammes ...	8 grains, 0·51 grammes ...	257	16·005								
LXXIII	Iodic Hydrargyri ...	Do. ...	2 grains, 0·13 grammes ...	6 grains, 0·38 grammes ...	214	13·8	31 10 92 22 11 92	22	5 11 92 17 11 92	15 11 92 22 11 92	10 5	Nil ...	110	109
	Arsenic ...		3 grains, 0·19 grammes ...	7·5 grains, 0·48 grammes ...	795	51·51	22 11 92 16 2 93	87	26 11 92	......	84	Death ...		

TABLE XVII—*continued.*

Horse Number.	Treatment.	How administered.	Minimum dose.	Maximum dose.	Total quantity of each drug administered in Grains.	Total quantity of each drug administered in Grammes.	Date From—To under each form of Treatment.	Number of days under form of Treatment.	Date of disappearance of hæmatozoa from the blood.	Date of re-appearance of hæmatozoa in the blood.	Number of days hæmatozoa absent.	Result of Treatment.	Number of days which elapsed between the first appearance of disease and death.	Number of days under Treatment for Surrs.
LXXIV	Santonin	Do. ...	30 grains, 1·94 grammes ...	30 grains, 1·94 grammes ...	60	3·88	10 11 92 11 11 92	2	......	......	...	Nil ...	38	31
	Iodic Hydrarg		4 grains, 0·25 grammes ...	6 grains, 0·38 grammes ...	56	3 62	16 11 92 21 11 92	6	......	19 11 92	3	Nil ...		
	Quinine		180 grains, 11·65 grammes...	180 grains, 11·65 grammes...	540	34·95	15 20 11 92 21	...	16 11 92	19 11 92	3	Nil ...		
	Arsenic		5 grains, 0·32 grammes ...	6 grains, 0·38 grammes ...	274	17·75	22 11 92 14 12 92	23	23 11 92 28 11 92	27 11 92 15 12 92	4 18	Death...		
LXXVI	Potassæ Hydrate	Do. ...	14 grains, 0·907 grammes ...	17·5 grains, 1·133 grammes..	220·75	14·304	26 11 92 1 12 92	6	27 11 92	28 11 92	1	Nil ...	40	38
	Arsenic		3 grains, 0·19 grammes ...	7 grains, 0·45 grammes ...	313	20·28	3 12 92 3 1 93	32	9 11 92	......	27	Death ...		
LXXVII	Arsenic	Do. ...	4 grains, 0·25 grammes ...	6·5 grains, 0·42 grammes..	560	36·28	30 11 92 26 1 93	57	3 12 92 8 12 92 4 1 93 7 1 93	6 12 92 3 1 93 5 1 93 22 1 93	3 26 1 15	Death...	65	57
LXXVIII	Arsenic	Do. ...	4 grains, 0·25 grammes ...	6 grains, 0·38 grammes ...	116	7·51	7 12 92 17 12 92	11	11 11 92	......	7	Death ...	12	11
LXXIX	Arsenic	Do. ...	4 grains, 0·25 grammes ...	6 grains, 0·38 grammes ...	177	11·46	7 12 92 22 12 92	16	10 12 92	......	13	Death ...	16	16
LXXX	Arsenic	Do. ...	3 grains, 0·19 grammes ...	6 grains, 0·38 grammes ...	427	27·66	11 12 92 24 1 93	45	13 12 92	......	44	Death ...	46	45
LXXXI	Arsenic ... ... (i) ...	Do. ...	3 grains, 0·19 grammes ..	7·5 grains, 0·48 grammes..	274	17·75	23 12 92 8 1 93	17	25 12 92 29 12 92	26 12 92 2 1 93	1 4	Nil ...	41	30
	(ii) ...		5 grains, 0·32 grammes ...	7·5 grains, 0·48 grammes ...			11 1 93 20 1 93	10	14 1 93	19 1 93	5	Nil ...		
	(iii) ...		5 grains, 0·32 grammes ...	5 grains, 0·32 grammes ...			24 1 93 26 1 93	3	24 1 93	25 1 93	1	Death ...		
LXXXII	Arsenic	Do. ...	3 grains, 0·19 grammes ...	6·5 grains, 0·42 grammes...	525	34·02	23 12 92 17 2 93	57	25 12 92	......	64	Death ...	70	57
LXXXIV	Arsenic	Do. ...	4 grains, 0·25 grammes ...	4·5 grains, 0·29 grammes ...	55	3·56	28 1 93 2 2 93	6	28 1 93	8 2 93	11	Death ...	17	6

It will be seen from the accompanying Table of Treatment, that the first satisfactory results were obtained by the employment of the mixture of Cinchona Alkaloids and Arsenic—*vide* cases LXV and LXXII. In the former the hæmatozoon disappeared after six days of treatment, and remained absent for a period of twenty-seven days. But it was found that after the drugs had been administered for twenty-six days, symptoms of gastric irritation appeared, which were due to the Alkaloids, and consequently this form of treatment had to be discontinued, just at a critical stage of the experiment.

Arsenic alone had still more favourable results as regards the destruction of the hæmatozoon, as will be seen in the following table:—

TABLE XVIII.

Horse No.	Days of Treatment to disappearauce of hæmatozoon.	Amount of Arsenic to date of disappearance.	No. of days hæmatozoon absent.
LXXVII ...	8	82 grains	26
LXXVI ...	5·5	56 „	27
LXXX ...	2	12 „	44
LXXXII ...	2	16 „	64
LXXIII ...	3·5	41 „	84

In the above cases, the cause of death was usually Arsenical poisoning, and this was owing to the fact, that great difficulty was experienced in determining the length of period for which the chemical should be administered. It will be remembered that to prove the absence of the Surra organism from the blood, other animals have to be inoculated from the animal under treatment.

In the ordinary cases of Surra, where no treatment has been adopted, the latent period, when Guinea-pigs are inoculated, is only about a week; but when the fluid for inoculation is taken from an animal that has been subjected to prolonged Arsenical treatment, the latent period is extended to about three weeks, and this time must elapse before the above question can be decided. During this period the administration of Arsenic has to be continued, hence the animal may receive far more than is necessary for the total destruction of the organism.

Such results have been obtained from no other form of treatment, and I think it is rational, that in the future further experiments and investigations should be made, with a view to determine to what degree the administration of Arsenic can be safely carried. It is well known that no satisfactory results can be obtained without first producing the preliminary symptoms of poisoning by this metal.

B.—THE SUBCUTANEOUS INOCULATION OF BLOOD AND ITS DERIVATIVES IN ITS DIFFERENT FORMS, OBTAINED FROM ANIMALS SUFFERING FROM, OR WHICH HAD LATELY SUCCUMBED TO, SURRA.

A series of experiments were conducted, in order to test the efficacy or otherwise of the blood serum, as a protective agent against inoculated 'Surra,' or in other words to ascertain whether any substance capable of conferring immunity against the disease was present in it, when obtained from animals in whose circulation the hæmatozoon of Surra had been swarming for some days previously. In the first series, fresh blood containing numerous hæmatozoa was drawn from the horse immediately after death into sterilized glass vessels, and set aside for several hours in order to allow of the serum separating. The serum was then transferred to one of M. Pasteur's filters, and forced through a porcelain cylinder. Three rabbits and two Guinea-pigs were then subcutaneously injected with varying quantities, during a period of three days. On the evening of the third day each animal received subcutaneously 0·2c.c. of blood containing numerous hæmatozoa, another animal in each case receiving a like quantity so as to act as control experiments.

Rabbit A, which received 3·0c.c. serum after inoculation with the soiled Surra blood, survived the first appearance of the hæmatozoon twenty-four days.

B received 6·0c.c. serum, survived twenty-two days.

C received 9·0c.c. serum, survived forty days.

The control animal survived forty-seven days.

In the case of the Guinea-pigs—

X received 6·0c.c. serum, and survived the first appearance of the hæmatozoon after inoculation with the soiled Surra blood, thirty-four days.

Y received 6·0c.c. serum, and survived sixty-six days.

The control animal survived the first appearance of the hæmatozoon in the blood, eighty-four days.

TABLE XIX.

Animals.	Date of subcutaneous injections.	Quantity of horse serum injected.	Date of inoculation with blood containing the hæmatozoa.	Quantity of blood inoculated.	Date of the first appearance of the hæmatozoa in blood.	Date of death.	Number of days elapsing between inoculation and death.
					D. m. y.	D. m. y.	
Rabbit A	...	3·0c.c.	...	0·2c.c.	18-12-90	10-1-91	...
B	...	6·0c.c.	...	0·2c.c.	18-12-90	8-1-91	...
C	...	9·0c.c.	...	0·2c.c.	18-12-90	26-1-91	...
Control	...	...	...	0·2c.c.	...	...	...
Guinea-pig X ...	...	...	...	0·2c.c.	20-12-90	22-1-91	...
Y ...	...	...	...	0·2c.c.	20-12-90	23-2-91	...
„ Control ...	...	...	...	0·2c.c.	...	...	...

In the second series, blood was withdrawn from a horse immediately after death, in which the hæmatozoa of Surra had been swarming for some days, and immediately subjected to the method described by Ogata, as the one he used in isolating from the blood of dogs and fowls, substances capable of conferring immunity against anthrax, and swine erysipelas. Three Guinea-pigs were subjected to daily injection of this fluid in varying quantities: No. 1 received 0·5c.c., No. 2 0·75 c.c., No. 3 1·0 c.c. daily, for a period of eleven days. After each animal had received eleven injections, seven days were allowed to elapse, and on the eighth, all were inoculated with an equal quantity, viz., 0·2c.c. of blood containing numerous hæmatozoa, taken from a horse the subject of naturally contracted 'Surra'; at the same time a healthy animal was inoculated with a similar quantity to act as a control experiment.

The results were as follows :—

No. 1 received 5·5c.c. of the solution, and was inoculated with soiled blood on the 3rd Oct. The hæmatozoon appeared on the 7th October, and death occurred on the 12th December, sixty-six days after the discovery of the organism in the blood.

No. 2 received 8·5c.c. of the solution, and was inoculated with soiled blood on the 3rd October, the hæmatozoon appeared on the 6th, and death occurred on the 25th October, nineteen days after the discovery of the organism in the blood.

No. 3 received 11·0c.c. of the solution, was inoculated with soiled blood on the 3rd October, the hæmatozoon appeared on the 7th, and death occurred on the 1st November, twenty-five days after the discovery of the organism in the blood.

The control animal was inoculated on the 3rd October, the hæmatozoon appeared on the 8th October, and death occurred forty-two days after the organism appeared in the blood.

Consequently it will be observed, that the latent period in the three injected animals occupied 4, 3 and 4 days respectively, whilst in the control animal it occupied 5 days. The animal which received the smallest quantity of the above solution lived 66 days, and survived the other two by 47 and 41 days respectively, and the control by 24 days.

OBSERVATIONS.

In this first volume of the Surra Report, it is impossible to discuss satisfactorily the whole subject of the disease, owing to the large number of side issues affecting it, and to the fact, that in Volume II the Idiopathic disease as it occurs in rats, dogs, and other animals than horses, has to be treated and discussed, as well as the presence of the Infusorian in certain kinds of fish.

The localities, in which the disease occurs, are found generally within a belt, bordered by the 18° and 24° of N. Latitude and are of two kinds: first, those in which the disease is known to be *endemic,* and second, those in which it has occurred either at intervals of some years, or on one known occasion only. The former are damp and low-lying, possessing a warm, humid and equable climate, exceedingly favourable for the development of Infusorial life; the latter are also low-lying, but have a climate almost exactly opposite to the other, *viz.*, a dry atmosphere for many months of the year, a considerable variation of temperature, and a comparatively small rainfall. The rivers, however, in the latter localities are liable to inundate the surrounding district, and thus contaminate with the Infusorian the herbage employed for feeding purposes.

The main point ascertained in this enquiry is, that the Infusorian of Surra can in the first place be made to disappear from the blood of affected animals, by subjecting the latter to a short course of treatment with Arsenic; and, by a more prolonged administration of the chemical, it can be completely destroyed; but the extent to which the Arsenic could be administered without injury to the animal is as yet unknown.

It is therefore of importance to large horse-owners to consider whether certain *preventive* steps should not be adopted previous to, and during the period in which outbreaks are usually known to occur, instead of treating the disease on its appearance; and this may be considered under two distinct heads, *viz.*:—

(*a*) The destruction of the organism in the food and water;

(*b*) The prevention of its development, by the administration of Arsenic to animals inhabiting an endemic area.

In the first case, the method to be suggested would be the exposure of the organism for a brief period to the temperature of 212° F. This could be attained by boiling all the water employed for drinking purposes, and by submitting the food (corn and fodder) to the action of steam in specially constructed chambers.

The adoption of this process should not entail a great outlay where there is steam already available, and certain advantages would accrue besides the complete destruction of the Surra organism, *viz.* an improved digestibility of the corn and dry fodder, by which less would be required to keep the animals in good working condition; and the destruction of any injurious fungoid growths in musty or badly prepared hay.

In the second case, Arsenic would have to be administered in small, but gradually increasing doses for from two to three weeks at a time, with intervals of about the same period. The administration would have to commence at the end of the dry season, and be continued with the above intervals until the end of the rains.

The whole question, however, hinges upon whether the loss of animals from the disease is worth the expense and trouble entailed, by the adoption of either or both the above processes. To be of any service they would have to be carried out in a thorough manner for a long period, and the animals subjected to arsenical treatment would probably undergo a certain amount of depreciation in value.

HORSE SURRA

LIST OF APPENDICES TO THE REPORT.

Appendix I.—Naturally-contracted Surra Cases:—
  Horses I, II, III, X, LVI, LXV, LXX, LXXI, LXXII, LXXIII, LXXIV, LXXVI, LXXVII, LXXVIII, LXXIX, LXXX, LXXXI, LXXXII, LXXXIV.

" II.—Experimental cases by Gastric Ingestion of blood:—
  Horses XX, XXVI.

" III.—Experimental cases—Direct Injection of blood into the Jugular Vein:—
  Horses XIV, XV.

" IV.—Experimental cases—Subcutaneous Inoculation with *Ante-mortem* blood:—
  Horses V, VIII, VI, XXII, IV, XXX, XXI, XXIX, LXIV, LIX, LIV, LV, XXIV.

" V.—Experimental cases—Subcutaneous Inoculation with *Post-mortem* blood:—
  Horses XVIII, XIX, XXVII, XXIII, XI, XXXII, VII.

" VI.—Experimental cases—Subcutaneous Inoculation of blood previously passed through the Goat:—
  Horses XXXIII, XXXIV, inoculated with *Ante-mortem fluids.*
  Horses XXXVIII, XLI, XL, XXXI, L, inoculated with blood obtained *Post-mortem.*

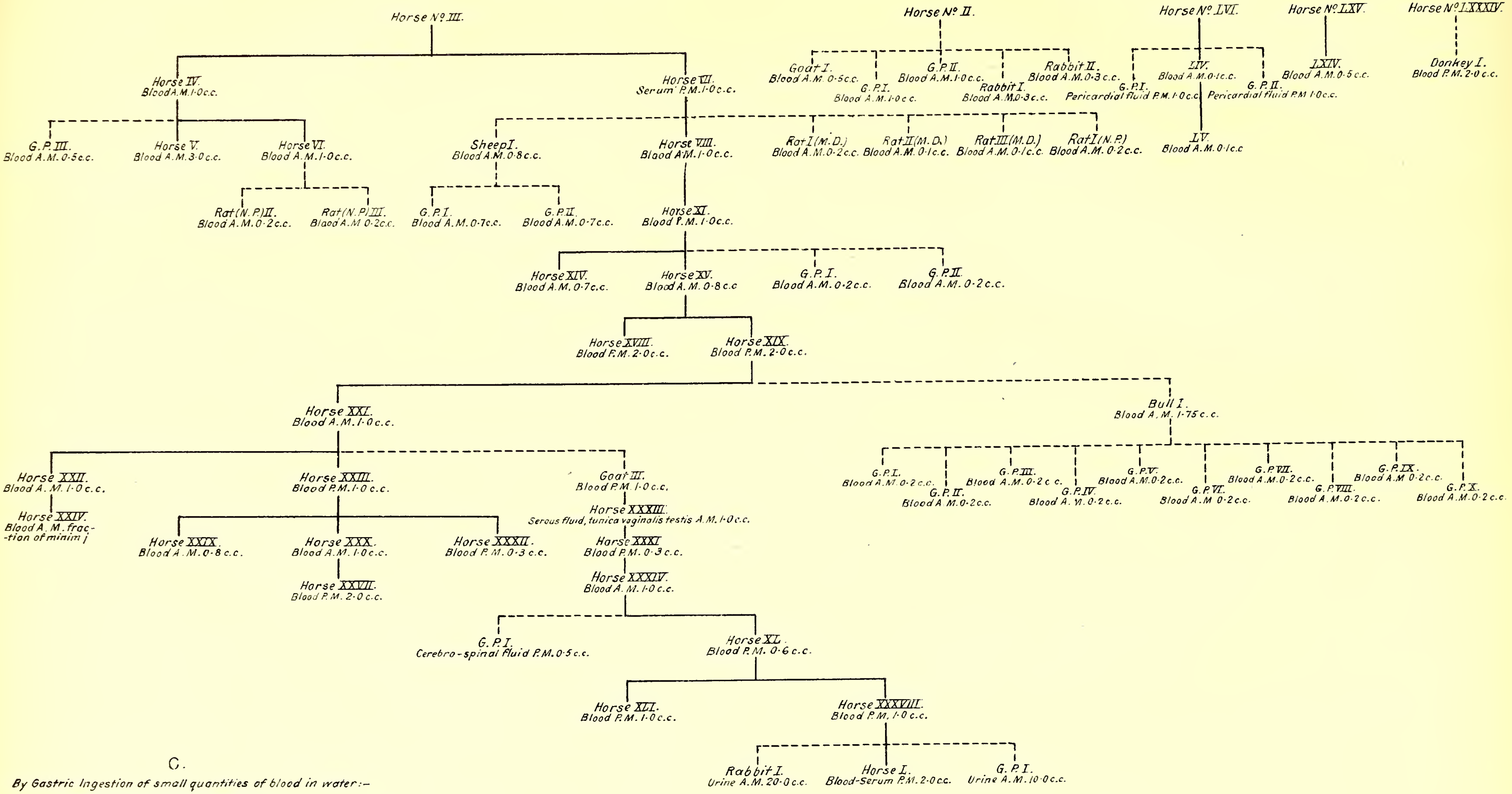
" VII.—Experimental cases—Various animals inoculated with Surra Horse blood and other fluids:—
  Bull—*Guinea-pigs* inoculated from.
  Sheep—*Guinea-pigs* inoculated from.
  Goats Nos. I, II, III.
  Rabbits.
  Guinea-pigs.
  Rats (*Mus decumanus*).
  Rats (*Nesokia providens*).
  Fowls.
  Pigeons.

" VIII.—Inoculation of—
  Small animals with urine of horses.
  Guinea-pigs with pericardial fluid.
  Guinea-pigs with cerebro-spinal fluid.

" IX.—Experimental Treatment.

A. *Naturally acquired Cases:—Horses Nos I, II, III, X, LVI, LXV, LXX, LXXI, LXXII, LXXIII, LXXIV, LXXVI, LXXVII, LXXIII, LXXIX, LXXX, LXXXI, LXXXII, LXXXIV.*

B. *Animals inoculated from naturally acquired Cases:—*


Horse Nº III.
Horse IV. Blood A.M. 1·0 c.c.
Horse VII. Serum P.M. 1·0 c.c.
G.P. III. Blood A.M. 0·5 c.c.
Horse V. Blood A.M. 3·0 c.c.
Horse VI. Blood A.M. 1·0 c.c.
Rat (N.P.) II. Blood A.M. 0·2 c.c.
Rat (N.P.) III. Blood A.M. 0·2 c.c.
Sheep I. Blood A.M. 0·8 c.c.
G.P. I. Blood A.M. 0·7 c.c.
G.P. II. Blood A.M. 0·7 c.c.
Horse VIII. Blood A.M. 1·0 c.c.
Rat I (M.D.) Blood A.M. 0·2 c.c.
Rat II (M.D.) Blood A.M. 0·1 c.c.
Rat III (M.D.) Blood A.M. 0·1 c.c.
Rat I (N.P.) Blood A.M. 0·2 c.c.
Horse XI. Blood P.M. 1·0 c.c.
Horse XIV. Blood A.M. 0·7 c.c.
Horse XV. Blood A.M. 0·8 c.c
G.P. I. Blood A.M. 0·2 c.c.
G.P. II. Blood A.M. 0·2 c.c.
Horse XVIII. Blood P.M. 2·0 c.c.
Horse XIX. Blood P.M. 2·0 c.c.
Horse XXI. Blood A.M. 1·0 c.c.
Bull I. Blood A.M. 1·75 c.c.
G.P. I. Blood A.M. 0·2 c.c.
G.P. II. Blood A.M. 0·2 c.c.
G.P. III. Blood A.M. 0·2 c.c.
G.P. IV. Blood A. M. 0·2 c.c.
G.P. V. Blood A.M. 0·2 c.c.
G.P. VI. Blood A.M 0·2 c.c.
G.P. VII. Blood A.M. 0·2 c.c.
G.P. VIII. Blood A.M. 0·2 c.c.
G.P. IX. Blood A.M 0·2 c.c.
G.P. X. Blood A.M. 0·2 c.c.
Horse XXII. Blood A.M. 1·0 c.c.
Horse XXIV. Blood A.M. fraction of minim
Horse XXIII. Blood P.M. 1·0 c.c.
Horse XXIX. Blood A.M. 0·8 c.c.
Horse XXX. Blood A.M. 1·0 c.c.
Horse XXVII. Blood P.M. 2·0 c.c.
Horse XXXII. Blood P.M. 0·3 c.c.
Goat III. Blood P.M. 1·0 c.c.
Horse XXXIII. Serous fluid, tunica vaginalis testis A.M. 1·0 c.c.
Horse XXXI. Blood P.M. 0·3 c.c.
Horse XXXIV. Blood A.M. 1·0 c.c.
G.P. I. Cerebro-spinal fluid P.M. 0·5 c.c.
Horse XL. Blood P.M. 0·6 c.c.
Horse XLI. Blood P.M. 1·0 c.c.
Horse XXXVIII. Blood P.M. 1·0 c.c.
Rabbit I. Urine A.M. 20·0 c.c.
Horse I. Blood-Serum P.M. 2·0 c.c.
G.P. I. Urine A.M. 10·0 c.c.
Horse Nº II.
Goat I. Blood A.M. 0·5 c.c.
G.P. I. Blood A.M. 1·0 c.c.
G.P. II. Blood A.M. 1·0 c.c.
Rabbit I. Blood A.M. 0·3 c.c.
Rabbit II. Blood A.M. 0·3 c.c.
Horse Nº LVI.
G.P. I. Pericardial fluid P.M. 1·0 c.c.
LIV. Blood A.M. 0·1 c.c.
G.P. II. Pericardial fluid P.M. 1·0 c.c.
LV. Blood A.M. 0·1 c.c
Horse Nº LXV.
LXIV. Blood A.M. 0·5 c.c.
Horse Nº LXXXIV.
Donkey I. Blood P.M. 2·0 c.c.

C.

By Gastric Ingestion of small quantities of blood in water:—

Horses Nº XX. XXVI. Goat Nº II.
ms: 291. 200 c.c. Blood A.M. 1·0 c.c.

Drawn & Litho: Govt Photozinco: Office, Poona 1893.

APPENDIX I.

NATURALLY-CONTRACTED SURRA CASES.

HORSES I, II, III, X, LVI, LXV, LXX, LXXI, LXXII, LXXIII, LXXIV, LXXVI, LXXVII, LXXVIII, LXXIX, LXXX, LXXXI, LXXXII, LXXXIV.

HORSE SURRA.

NATURALLY CONTRACTED.

CASES I, II, III.

These three cases of Surra marked I, II and III were considerably advanced before they came under observation. The horses were the property of a gentleman, living out at Páli Hill, Bándra, near Bombay, and had all been submitted to the same conditions as regards climate, locality, water and fodder, and although the cases occurred in 1890, Case No. LXV, dated June 1892, may be read at the same time with advantage in connection with them, as the two stables, in which the cases occurred, are only a few hundred yards apart. The water, which is supposed to have been the vehicle by which the contagium was carried in the two outbreaks, was obtained from wells of the same description, the water in which had become low and turbid during the hot weather. This being the case, the notes, which accompany Case LXV, are applicable to the above three. The owner of these horses was conversant with the fact that by supplying his animals with grass grown on low marshy ground he was running a considerable risk of introducing Surra amongst them, and he had, therefore, for some time previous to this outbreak, taken the precaution of obtaining all the requisite grass from as near the highest point of the surrounding hills as possible. Taking all this into consideration, it appears to be extremely probable that the well-water was the means by which the disease was introduced.

CASE No. I.—October 30th, 1890.—The subject of this case, a Grey Arab horse, 7 years old, arrived from Bombay on the 29th October 1890. He is said to have been ill for about 6 or 7 weeks; the pulse is 44, temp. A.M. 35·5° C., P.M. 39·5° C. and the animal is in poor condition and weak. There is some superficial ulceration of the Schneiderian membrane of the near-nostril and a profuse discharge of thick mucus flowed from the off-nostril. The gait is staggering: the rectum is patent and there is an almost constant escape of flatus from it. The breathing is slow and abdominal in character. There are numerous and active hæmatozoa in the blood.

October 31st.—The patient appears weaker, the ulceration in the near-nostril has increased in extent and the discharge from the off-nostril is more copious than yesterday. On account of the dilated condition of the rectum the temperature could not be taken. Hæmatozoa are swarming in the blood, but none could be found in the mucus from the nostril. At 9-30 A.M. the horse fell. The temperature was found to be 36·5°C. at this time. At 10 A.M. death occurred.

AUTOPSY at 12-30 *P.M.*—Body emaciated, tissues blanched, a small number of parasites (*ascaris megalocephala*) found free in the abdominal cavity. The Schneiderian membrane presents a congested and thickened appearance over the turbinated bones. This condition gave rise during life to a peculiar snuffling noise in breathing. *Liver* apparently healthy. *Kidneys* and *spleen* somewhat soft, *stomach* contracted and containing some fluid ingesta. The cuticular portion thickened to three or four times its normal thickness, villous portion congested; there are several large ecchymoses dotted over the surface of the villous portion, purple in colour. The small and large *intestines* present several congested and ecchymosed patches in their course, but there is no sign of inflammation. The mucous membrane of the small intestine appears somewhat thickened and contains a yellow viscid fluid.

Remarks.—The disease had reached a very advanced stage previous to the animal's arrival at the Laboratory, and he only lived two days after admission.

The chief points of interest in this case are:—

(i). The superficial ulceration of the Schneiderian membrane of one nostril and the profuse discharge of thick mucus from the other.

(ii). The patent condition of the rectum, which is often noticed a few days before death and generally continues until the end.

(iii). The snuffling respiration due to the thickened condition of the membrane covering the turbinated bones.

(iv). The ecchymosed condition of the villous portion of the stomach and the patches or groups of petechiæ found lying on the mucous membrane of the large and small intestines, principally the latter.

CASE No. II.—October 30th, 1890.—The subject of this case, a Bay Arab Gelding, 8 years old, arrived from Bombay on the 29th October 1890. He is in very poor condition, weak and staggering in his gait. There is effusion of blood into the anterior chambers of both eyes, a slight mucous discharge is noticed flowing from both nostrils, snuffling respiration, more marked than in Case No. I, and a moist cough. The appetite is good. Only one hæmatozoon observed in two specimens. of blood. Pulse 72, hard and quick. Temp. A.M. 39° C., P.M. 40·6° C.

October 31st.—Temp. A.M. 39·3°C., pulse fallen to 52. The effusion into the anterior chambers of both the eyes has increased. The horse is weaker than yesterday. Hæmatozoa present in the blood but not numerous.

November 1st.—Temp. A.M. 39·6° C., pulse 68, hard ; patient more emaciated. Numerous petechiæ have appeared on both membranæ nictitantes. Cough still rather troublesome. Appetite good. Hæmatozoa few.

November 2nd.—Temp. A.M. 39·3° C., pulse again risen to 78 and hard in character. The animal gets weaker. Hæmatozoa very numerous in the blood. Two Guinea-pigs and two rabbits were inoculated from this horse at 12-30 P.M.

November 3rd.—Temp. 38·9° C., pulse 82, hard and irritable, slight ulceration noticed in the near-nostril. The appetite is poor. Urine clear and copious.

November 4th.—Temp. 39·7° C., pulse 99, hard and irritable, respirations hurried. The animal is now almost blind, he persistently stands, although maintaining the upright position with difficulty. Hæmatozoa swarming in the blood. At 10 A.M. ;—A male goat was inoculated with the blood from this horse. At 12 P.M. the horse fell, and after struggling for some time death took place at 12-45 P.M.

AUTOPSY at 1-30 P.M.—Body emaciated, yellow exudation under the skin in the sternal region. There were about four ounces of an opaque, amber-colored fluid found in the pericardial sac and one hæmatozoon was discovered on microscopical examination of the above fluid. There was pneumonic consolidation of the anterior and outer borders of the right lung, from which on section a frothy and muco-purulent fluid flowed from the cut ends of the tubes. There were ecchymoses dotted over the visceral pleuræ, varying from a pink to a purple colour, the apex of the right lung presented the same pneumonic condition. The *spleen* is somewhat enlarged and there are a few petechiæ dotted over the surfaces of the capsule. The *liver* is the seat of superficial hepatitis ; on section the tissues are dark in colour, but appear normal. The *kidneys* are pale and present no ecchymoses on their surfaces, the *stomach* is contracted and contains only fluid ingesta, coats thickened, the cuticular portion presenting a yellow colour, more especially near the line of demarcation between the cuticular and villous portions. There are some few petechiæ on the villous coat, there is an effusion of blood into the anterior chambers of both eyes, and on section the clots present a yellowish colour.

Remarks.—The disease in this animal as in the case of No. I, was considerably advanced on its arrival at the Laboratory and it survived only six days after admission. The chief points of interest in this case are :—

(i). The effusion of blood into the anterior chambers of both eyes observed six days before death.

(ii). Slight ulceration on the septum of the left nostril.

(iii). The yellow exudation found lying in the subcutaneous tissue of the sternal region the circumscribed patches of pneumonia, the yellow staining of the tissues in the stomach especially on the cuticular portion, and lastly the presence of the Surra hæmatozoon in the pericardial fluid observed *post-mortem.*

CASE No. III, October 30th, 1890.—The subject of this case, a Brown Arab Gelding, aged and in fair condition, arrived from Bombay on the 29th October 1890, and is said to have been ill for about sixteen days. Temp. A.M. 37·9° C., pulse 44, strong and full. The animal looks bright. There is an Urticaria-like eruption on the skin of the head, neck and body. The appetite is good. A slight blowing noise is heard during respiration, and there is a slight cough present, but it is not troublesome. There are no œdematous swellings either on the limbs or body, and there are no hæmatozoa present in the blood. Temp. P.M. 38·8° C.

October 31st.—The animal is in about the same condition ; several petechiæ have appeared on the conjunctival membranes. Temp. P.M. 38·8° C., pulse 46. Hæmatozoa few in the blood.

November 1st.—Temp. A.M. 40°C., pulse 52, the conjunctivæ are pallid and studded with a few petechiæ. Appetite good. Hæmatozoa few in the blood. Temp. P.M. 40·9° C.

November 2nd.—The general condition is unchanged. Hæmatozoa few in the blood. Temp. A.M. 39·4° C, P.M. 40·2° C.

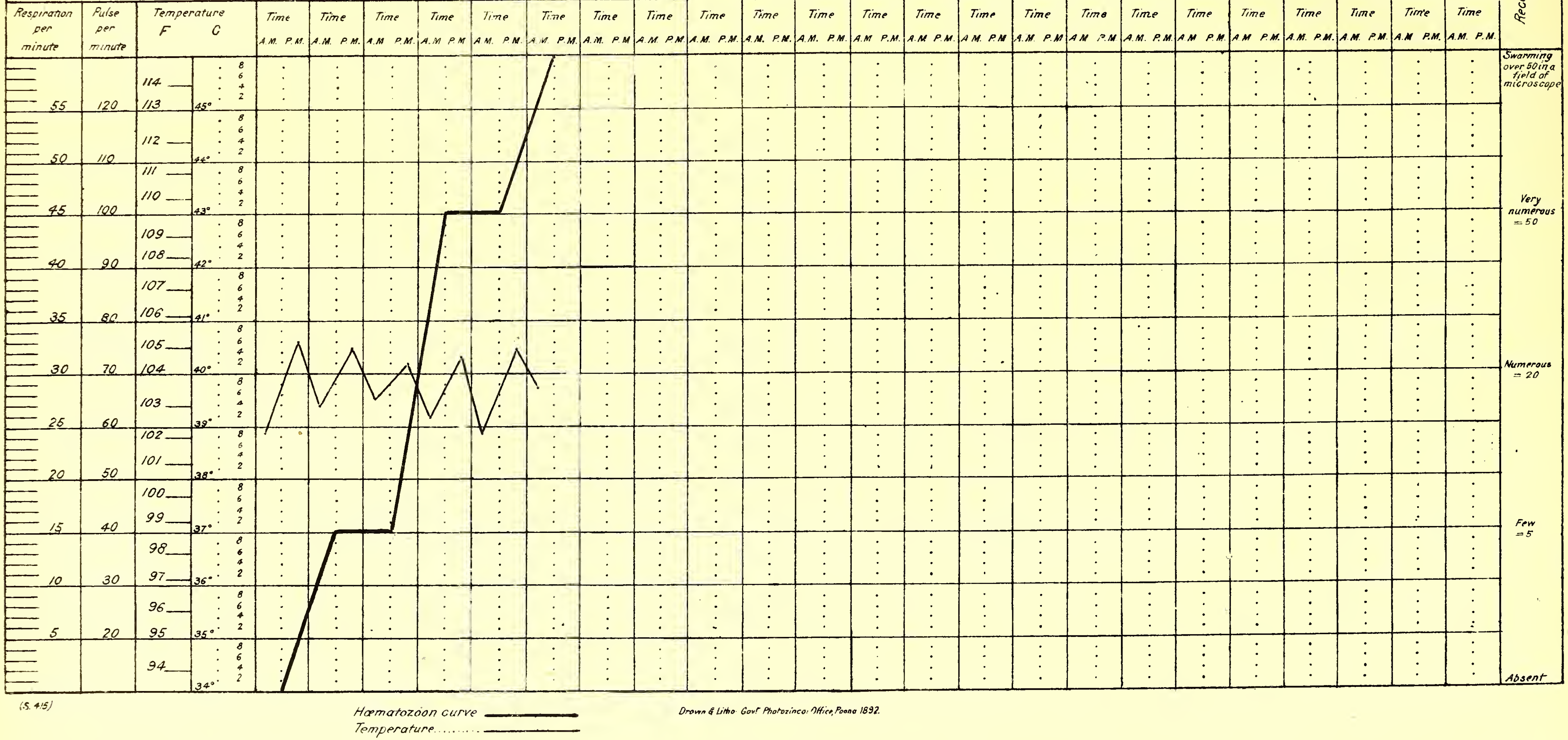
November 3rd.—Temp. A.M. 38·8° C., pulse 40. No appreciable change in the general condition, excepting slight swelling of the sheath. Appetite good. Temp. P.M. 40·2° C.

November 4th.—Temp. A.M. 39° C., pulse 50. The animal is not looking so well this morning but the appetite remains good. Only three hæmatozoa observed in two specimens of blood. Temp. P.M. 39·6° C.

Age, 8. Sex, Gelding. Colour, Brown.

Disease, "Surra." Naturally contracted Date of Attack, 17. 10. 90. Result, Death Date of Result 10. 12. 90. Register No. 2

Dates of Observation	Oct: 30	31	Nov: 1	2	3	4
Days of Disease	47	48	49	50	51	52
Organisms in Blood	—	F	F	VN	VN	S



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Drawn & Litho: Govt. Photozinco: Office, Poona 1892.

November 5th.—Temp. A.M. 39°C., pulse 42. The animal is dull but the appetite continues good; there are well marked petechiæ on the membranæ nictitantes. Hæmatozoa more numerous than yesterday.

November 6th.—Temp. A.M. 39·3°C., pulse 68 hard. The animal is brighter this morning, appetite good, hæmatozoa numerous in the blood. Temp. P.M. 40·4°C.

November 7th.—Temp. A.M. 40·3°C. In about the same condition, but the limbs are now swollen and œdematous and the swelling of the sheath has increased in size. Appetite remains good. Hæmatozoa few in the blood. Temp. P.M. 40·3°C.

November 8th.—Temp. A.M. 39·3°C., pulse 46. The animal has lost flesh more during the week than previously, but the appetite remains good. There are no hæmatozoa in the blood. Temp. P. M. 39·1°C.

November 9th.—Temp. A.M. 38·6°C., pulse 42. The petechiæ on the conjunctivæ are beginning to fade. The animal has regained power in the near fore-limb, but is still weak in the fetlock joint. No hæmatozoa. Temp. P.M. 39·2°C.

November 10th.—Temp. A.M. 38°C., pulse 40. In about the same condition. One hæmatozoon only observed in three cover-glass specimens of blood. Temp. P. M. 39·6°C.

November 11th.—Temp. A.M. 39·3°C., pulse 48. In about the same condition. Two hæmatozoa only observed in two cover-glass preparations of the blood. Temp. P.M. 40°C.

November 12th.—Temp. A.M. 40·1°C., pulse 52. No marked change in the general state; there is conjunctivitis of the right eye. Hæmatozoa few in the blood. Temp. P.M. 39·8°C.

November 13th.—Temp. A.M. 38·8°C., pulse 40. There is now conjunctivitis of both eyes. The œdema of the limbs and sheath is increasing and extending under the abdomen. Two hæmatozoa only were seen in three cover-glass specimens of the blood. Temp. P.M. 39·7°C.

November 14th.—Temp. A.M. 38·8°C., pulse 44. Effusion of blood has taken place into the anterior chambers of both eyes. The œdema has extended along the under-surface of the abdomen and between the fore-legs. Two hæmatozoa were observed in two cover-glass specimens. Temp. P.M. 40·6°C.

November 15th.—Temp. A.M. 38·8°C., pulse 44. The animal is dull this morning, but the appetite remains good. The effusion into the anterior chambers of the eyes has increased in amount. The œdema is increasing and the animal is wasting gradually away. Hæmatozoa numerous in the blood. Temp. P.M. 41°C.

November 16th.—Temp. A.M. 39·8°C. There is no perceptible change in the animal's condition. Hæmatozoa in the blood. Temp. P.M. 41°C.

November 17th.—Temp. A.M. 39·7°C. No perceptible change in condition. No hæmatozoa in the blood. Temp. P.M. 40·3°C.

November 18th.—Temp. A.M. 37·9°C. No change in the animal's condition. No hæmatozoa in the blood. Temp. P.M. 40°C.

November 19th.—Temp. A.M. 39°C. The effusion into the anterior chambers of the eyes has increased as has also the œdema under the abdomen. No hæmatozoa in the blood. Temp. P.M. 40·3°C.

November 20th.—Temp. A.M. 39·1°C. There is no apparent change in the animal's condition, but he is now almost totally blind; the appetite remains good, but the animal continues to lose flesh steadily. One hæmatozoon seen in two cover-glass preparations of blood. Temp. P.M. 40·1°C.

November 21st.—Temp. A.M. 39·1°C. In about the same condition as yesterday. A small hard tumour is detectable in the upper lip near its free margin. Hæmatozoa numerous and active in the blood. Temp. P.M. 41°C.

November 22nd.—Temp. A.M. 39·5°C. No apparent change in the animal's condition. Hæmatozoa numerous in the blood. Temp. P.M. 40·5°C.

November 23rd.—Temp. A.M. 39·6°C. No change. Hæmatozoa few in the blood. Temp. P.M. 37·6°C.

November 24th.—Temp. A.M. 37·7°C. Not so dull this morning, is feeding well but is getting gradually weaker and more emaciated. No hæmatozoa in the blood. Temp. P.M. 38·9°C.

November 25th.—Temp. A.M. 38°C. No appreciable change in the animal's condition. No hæmatozoa in the blood. Temp. P.M. 38·9°C.

November 26th.—Temp. A.M. 38·4°C. No change since yesterday. No hæmatozoa in the blood. Temp. P.M. 39·5°C.

November 27th.—Temp. A.M. 38·5°C. The œdema is now very great, the hind legs quite round and the layer under the abdomen two inches in depth. Appetite remains good. Hæmatozoa few in the blood. Temp. P.M. 39·1°C.

November 28th.—Temp. A.M. 38·9°C. The animal is getting very weak and unsteady in his gait, and is much emaciated; he is however able to rise from the recumbent position. He is quite blind from the effusion into the anterior chambers of the eyes. The appetite remains good. Hæmatozoa few in the blood. Temp. P.M. 39·5°C.

November 29th.—Temp. A.M. 38·4°C. No change since yesterday. Hæmatozoa numerous in the blood. Temp. P.M. 40·5°C.

November 30th.—Temp. A.M. 39·6°C. The animal appears dull, hanging his head this morning; appetite remains unimpaired. Hæmatozoa numerous in the blood. Temp. P.M. 40·6°C.

December 1st.—Temp. A.M. 39°C. In about the same condition as yesterday. The hæmatozoa numerous in the blood. Temp. P.M. 39°C.

December 2nd.—The animal is very dull this morning and the appetite is capricious, the gait is very unsteady and the œdema has increased. The pulse is hard, frequent and irritable. Hæmatozoa numerous in the blood. Temp. P.M. 40°C.

December 3rd.—Temp. A.M. 38·8°C. The animal is still dull, but has improved very slightly since yesterday. The appetite is fair but not normal, and the patient is daily growing weaker. No hæmatozoa in the blood. Temp. P.M. 39·4°C.

December 4th.—Temp. A.M. 38·4°C. In about the same state as yesterday. No hæmatozoa in the blood. Temp. P.M. 40°C.

December 5th.—Temp. A.M. 39°C. Is a little brighter this morning, but is very weak and scarcely able to walk about. No hæmatozoa in the blood. Temp. P.M. 39·7°C.

December 6th.—Temp. A.M. 39·9°C. No perceptible change in the animal's condition. No hæmatozoa in the blood. Temp. P.M. 39·6°C.

December 7th.—Temp. A.M. 39·2°C. Animal getting weaker. No hæmatozoa in the blood. Temp. P.M. 39·3°C.

December 8th.—Temp. A.M. 39·7°C. The animal is very dull and weak this morning and the appetite is bad. Hæmatozoa few in the blood. Temp. P.M. 39·9°C.

December 9th.—Temp. A.M. 37·3°C. The animal is sinking, very dull, and scarcely eating anything. He can hardly stand. The pulse is small, hard and frequent and the heart-beats are tumultuous. The conjunctivæ are deeply petechiated. Hæmatozoa very numerous in the blood. Temp. P.M. 37·6°C.

December 10th.—Temp. 37·6°C. The animal fell this morning at about 11 o'clock. He exhibits extraordinary rigidity of the sterno-mastoids and the large muscles of the neck and fore-limbs; the fore-legs are extended and rigid, tetanic in character. Death took place at 2-30 P.M.

AUTOPSY.—Immediately after death. Body emaciated, both corneæ opaque. The hard nodule alluded to as present in the upper lip when examined is found to be a cyst with fibrous walls, one-eighth of an inch in thickness, containing a viscid, glairy material resembling white of egg. No hæmatozoa were found in this fluid on microscopical examination. The *pleural cavities* contain no fluid. The *lungs* present localized patches of emphysema, but no pneumonia. The *heart* is enormously distended with blood, and walls of the left ventricle are considerably hypertrophied. *Stomach* contains a quantity of semi-fluid ingesta. One localized patch of superficial congestion is noticed on the greater curvature. About two inches from the boundary-line on the villous portion there are three raised nodules nearly circular in form, from 1½″ to 2″ diameter, the greatest thickness being in the centre, and gradually tapering to the edges. On section they are found to be loculated, the intervening walls being of a white fibrous nature. These nodules contained "*spiroptera megastoma*".

Spleen much increased in size. The surface is dotted over with small, brown circumscribed extravasations.

Liver.—The only abnormality noticeable in the liver is the presence of numerous circumscribed pearly-white bodies resembling tubercle. These bodies are scattered over the surface of the organ showing through Glisson's capsule and are also imbedded in the liver-tissue.

Kidneys.—Capsules adherent in places. On the surface of the right kidney is found an oval red patch about ½″ in length and ¼″ in width and dipping into the cortical substance to the extent of ⅓″. *Mesenteric glands.* Considerably enlarged, very dark in colour and on section presenting the appearance of splenic tissue.

Intestines.—Apparently healthy.

Bladder.—Apparently normal.

A quantity of blood was collected from the heart in this case; after allowing it to stand, the serum was pipetted off and passed through a porcelain filter. Different quantities, as per notes, were injected subcutaneously into three Rabbits and two Guinea-pigs.

Remarks.—This animal was much stronger on its arrival at the Laboratory than the other two. It had only been ill for about 16 days previous to its journey to Poona. During the period it was under our observation, it passed through four relapses, taking the duration of a relapse from the time when the hæmatozoa are absent from the blood through the period during which they are numerous until they again disappear from the blood. The first period during which the hæmatozoa were present lasted for eight days and was followed by an interval of two days when they were absent. The second period lasted for seven days and was followed by another interval of three days' absence. The third period lasted four days only and was followed again by three days' interval. The fourth period lasted six days and was followed by a much longer interval, *viz.*, five days, after which the hæmatozoa became very numerous, but were much fewer before death occurred. The chief points of interest in this case are:—

(i) The Urticarial form of eruption occurring between the second and third week after the animal had been attacked with the disease.

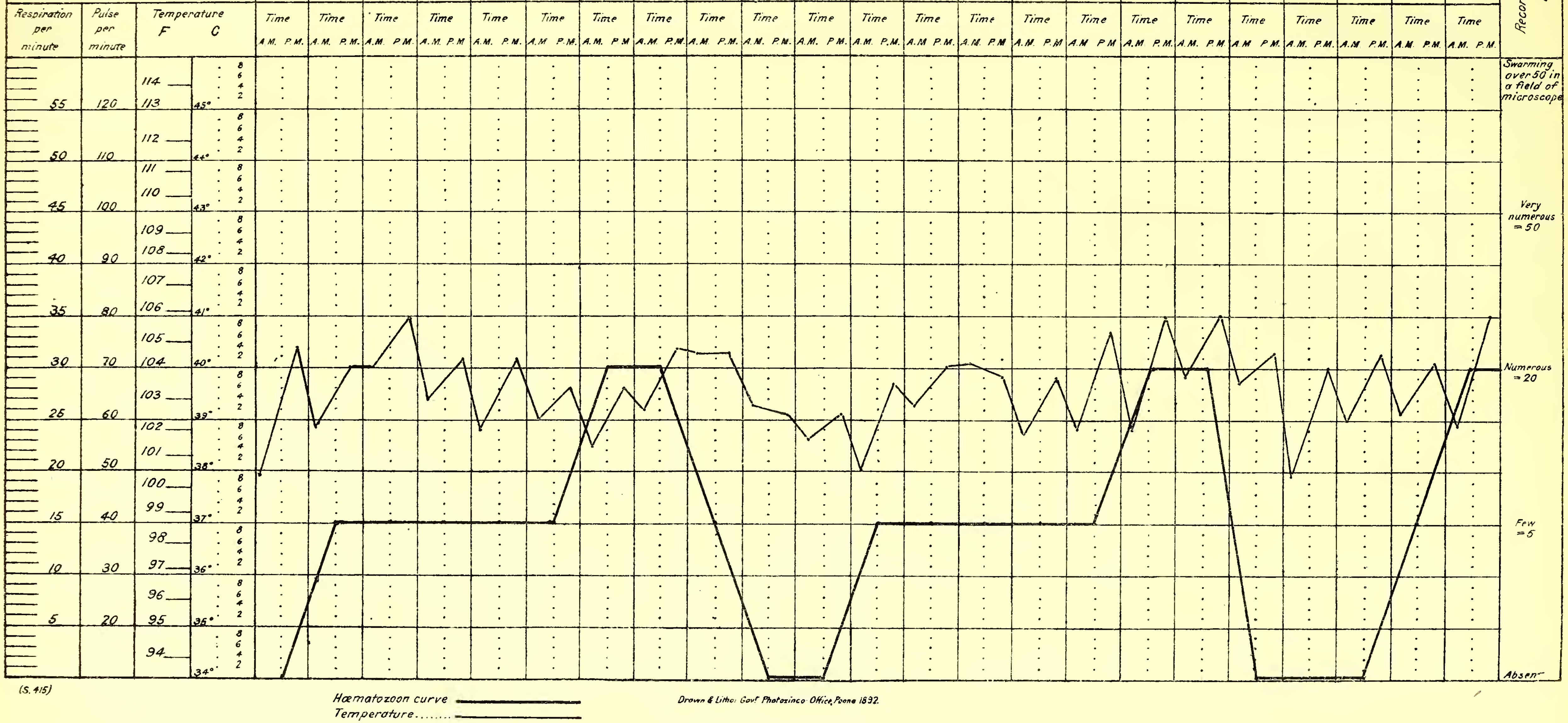
(ii) The effusion of blood into the anterior chambers causing total blindness.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Arab horse Age, 7 Sex, Gelding Colour, Brown

Disease, "Surra" acquired naturally Date of Attack, Oct. 15th 1890.? Result, Death Date of Result, Nov. 10th 90 Register No. 111

Dates of Observation.	Oct. 30	31	Nov. 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Days of Disease	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
Organisms in Blood.	—	F	F	F	F	F	N	N	F	—	—	F	F	F	F	F	N	N	—	—	—	F	N



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Drawn & Litho: Govt. Photozinco Office, Poona 1892.

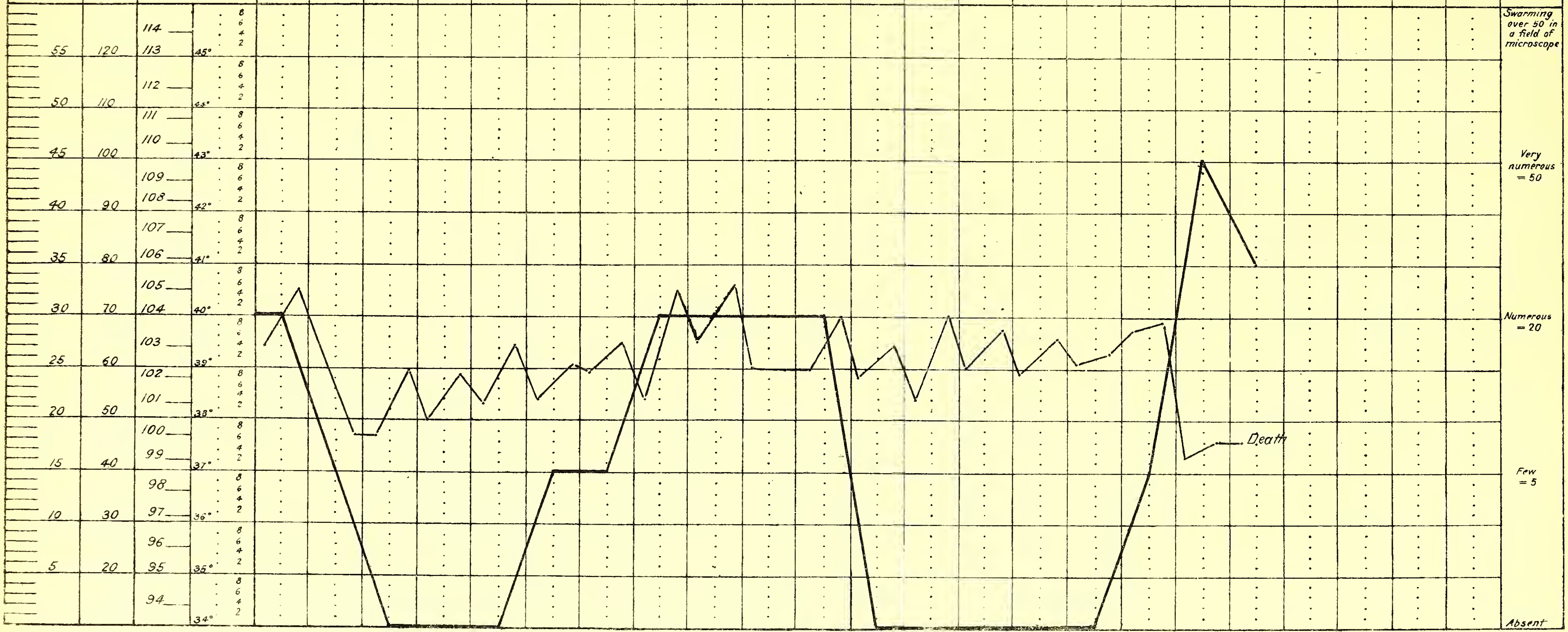
RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age, 7 Sex, Gelding Colour, Brown

Disease, Surra Date of Attack, Oct. 15th 90 ? Result, Death Date of Result, 10-10-90 Register No. 111

Dates of Observation.	Nov. 22	23	24	25	26	27	28	29	30	Dec. 1	2	3	4	5	6	7	8	9	10	11	12	13	14
Days of Disease	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57				
Organisms in Blood	N	F	—	—	—	F	F	N	N	N	N	—	—	—	—	—	F	VN	N				
Respiration per minute · Pulse per minute · Temperature F C	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.

Record of Organisms in Blood.



(S. 415)

Hæmatozoon curve ——
Temperature ....

Drawn & Litho: Gov^t Photozinco: Office Poona 1892.

CASE No. X.—GREY COUNTRY-BRED MARE, aged. Admitted December 31st, 1890, the property of a Gádiválá, who stated that he had brought it from Bombay about 15 days before. The animal is much emaciated, and very weak and walks with difficulty. There is no œdema of the abdomen or extremities. The visible mucous membranes are pallid, but there are some petechiæ on the conjunctival membranes. Hæmatozoa numerous in the blood. Temp. A.M. 39·4°C., P.M. 40°C.

1st January 1891.—Temp. A.M. 39·8°C, P.M. 39·1°C. Hæmatozoa numerous in the blood, pulse 120, eyes fixed, breathing hurried. Moribund. Some hours previous to death the patient was attacked with colic and frequently looked round at her left side.

Death took place at 6 P.M.

AUTOPSY at 11 A.M. *January 2nd.*

Body emaciated, but absolutely free from œdema. On opening the thoracic cavity some jelly-like yellow-coloured exudation is observed, lying between the pericardium and the sternum.

Lungs.—The apex and upper lobe are fully distended with air. There are some very small emphysematous areas dotted over the anterior portion of the organ. About the centre of the superior and outer surface of the organ there is a patch, five inches square, which presents a peculiar mottled appearance, caused by a network of vessels on its surface. This portion of the visceral pleura is thickened and there is a collection of jelly-like exudation underneath it. *On Section* the lung is found to be semi-solid to the touch. This portion of lung is wedge-shaped and much lighter in colour than the surrounding tissues which are of a dark claret hue. The tissue floats in water, and on pressure a quantity of fluid mixed with air exudes from the surface.

Left lung.—Apex fully distended with air. Upper $\frac{2}{3}$rds of a greenish black colour. Lower $\frac{1}{3}$rd tolerably normal in colour. *On Section* this lung presents circumscribed patches of almost black colour, the intervening spaces being pinkish red. On pressure blood-stained fluid mixed with air exudes freely.

Spleen.—Enlarged. The capsule is dotted over with small, irregular shaped petechiæ.

Kidneys.—The right presents two petechiated patches, lying on the external cortical portion. One, a quarter of an inch square, the other somewhat smaller.

Liver.—There are numerous, small, irregular bodies of a yellowish-white colour lying under Glisson's capsule, and *on section* of the organ many are observed lying in the tissue; but they are very easily enucleated.

Heart.—The pericardium contains a small quantity of a yellow colored fluid, in which no hæmatozoa were discovered. The external surface of the organ is pale in colour and quite free from blood extravasations. The right side contains a large decolorized clot floating in dark fluid blood; there are no sub-endocardial ecchymoses. Valves healthy. The left side of the organ is contracted and contains very little blood, only a small clot. There are signs of fatty degeneration of the muscular structure. There are no sub-endocardial ecchymoses. Valves healthy.

Stomach.—Healthy, no lesions of any kind.
Intestines.—No pathological lesions observed.

Bladder.—Healthy.

The points of interest in this case are:—

(i). The presence of a horse suffering from naturally-acquired Surra on the Deccan plateau, and the discovery of its previous Bombay history.

(ii). The rapidity with which the disease advanced, owing to the animal having to work in a vehicle plying for hire.

(iii). The slight pathological lesions found at the *Post-mortem* examination.

CASE No. LVI.—GREY ARAB, ENTIRE (aged). Admitted in Bombay on the 18th December 1891 at 10-10 A.M. with a history of fever of one month's duration.

Temp. 40·1°C. Blood contained numerous Surra parasites. The animal contracted the disease in Bombay. It is emaciating day by day, but has never been off its feed during the above period.

Sent up to Poona on the 23rd evening and arrived on the morning of the 24th. Hæmatozoa very numerous in the blood.

24th December.—Temp. A.M.—1 P.M. 39·3°C., 5 P.M. 40·3°C. Hæmatozoa very numerous in the blood.

25th.—Temp. A.M. 38·4°C., 1 P.M. 38.7°C., 5 P.M. 40·4°C. Hæmatozoa swarming in the blood.

26th.—Temp. A.M. 36·1°C., P.M. 37·4°C., 5 P.M. 39·7°C. Hæmatozoa swarming in the blood.

27th.—Temp. A.M. 35·4°C., P.M. 38°C., 5 P.M. 38·2°C. Hæmatozoa swarming in the blood.

Animal died at 9-30 P.M.

AUTOPSY.—December 28th, 1891, at 10 A.M.

Body somewhat emaciated, membranes of a yellow colour with numerous petechiæ on the conjunctival membranes of both eyes.

Thorax.—No fluid in the pleural cavities and no adhesions. *Right lung* much distended with air from decomposition; no signs of any small, circular extravasations on the surface of the organ. *On section* the cut surfaces are of a greenish tinge from decomposition having set in. *Left lung* pale, no extravasations, slight emphysema at the apex. On section pale in colour with localized patches red in colour, due to small extravasations giving a marbled appearance to tho tissues.

Heart.—Extensive extravasations running down the course of the anterior coronary vessels and in some places extending from half an inch to one inch on either side of them. *Right auricle* and *right ventricle* blood-stained, no extravasations. *Left auricle* nil. *Left ventricle* numerous, slight sub-endocardial extravasations chiefly involving the musculi-papillares and also one or two of the valves (tricuspid). The extravasations do not appear on section to penetrate into the muscular substance of the organ.

Abdomen.—The peritoneal cavity is free from fluid.

Stomach.—*Cuticular* portion healthy, the *villous* portion is normal in colour, and presents a raised lump with a crater-like opening on the summit, about one and a half inches from the line of demarcation. The lump measures two inches in diameter and is raised half an inch above the surrounding tissue. About a quarter of an inch below the inside rim of the crater-like opening at the summit of the tumour are five or six openings, very much resembling the structure of a honeycomb. *On section,* the tumour is found to be pale in colour and to be made up of small spaces, partitioned off. It is probably a nest of the "*spiroptera megastoma.*"

Liver.—Weighs 11 lbs. 3½ ounces.

The convex surface shows signs of old perihepatitis. The tissue of the organ is spongy from decomposition.

Spleen.—Somewhat large, weighs 3 lbs. 13 ounces; an old cicatrix, white in colour, occupies a position about the centre of the convex surface. *On section* tissues are firm and healthy.

Kidneys.—Right 1 lb. 11 ounces. Left 1 lb. 10 ounces. Capsule of the *right kidney* slightly adherent, surface somewhat granular, the posterior border presents numerous stellate veins considerably dilated and congested. *On section* this condition was found to permeate the cortical substance for about an inch.

Left Kidney.—Pale, capsule strips easily, no extravasations under the capsule.

Small Intestines.—Healthy, with the exception of a few ecchymoses dotted over the surface of the mucous membrane. No ulceration present.

Large Intestines.—Normal.

Bladder.—Normal.

CASE No. LXV.—AUSTRALIAN ROAN, aged (coarse bred). This animal arrived at 10 A.M. on the 12th June 1892 and came from the stables of Mr. R. Gilbert, Páli Hill, Bándra, near Bombay.

Previous history.—Mr. Gilbert owned four horses A, B, C, and D, which up to March 16th, 1892, were stabled on Malabar Hill, Bombay, and drank Vehár pipe water. On March 16th A, B and C were taken to Páli Hill, Mr. Gilbert having changed his residence. D was on the same date taken to the Fort, Bombay, and has only been at Bándra for two days up to the present, June 18th, 1892.

From March 17th to April 14th, 1892, A, B and C were watered from two wells on Páli Hill and no other water was supplied to them. The water in the above wells was low and rather dirty. About April 14th, 1892, the Sanitary Commissioner, after a chemical examination of the water from these two wells, pronounced it to be very bad; the horses were therefore given from the above date until April the 26th, nothing but the Vehár pipe water described as "excellent, clear water." On April 15th A refused her food and appeared feverish. . She gradually however got better and by April 26th appeared quite well.

On April 26th A, B and C were taken up-country into the jungles of Dharampore State, south of Surat on a Shikár expedition, and during this time were watered at rivers and wells, mostly the former, the water not appearing to be bad.

The horses did a considerable amount of work in the sun between April 26th and May 17th.

A, during this period, did not eat much grass; she ate her corn as usual however, but appeared dull and stumbled during action. Her skin appeared hot, and it was several times remarked that she was not well and appeared to be losing flesh. She was not therefore worked so hard as the others. The fever was thought to be the consequence of exposure to the sun.

On May 17th A, B and C were taken back to Páli Hill from Dharampore. A then looked unwell, and on the 19th was driven only a short distance, owing to the presence of fever. On her return she refused food and appeared to be very bad. Ordered Quinine and Spt. Æther. Nit āaʒij. On the 23rd May B refused food and an eruption broke out over the whole body, which passed away in a few days, leaving fever which continued until the 30th of the month.

Both horses received for some days.

Quinine ʒii and Spt.: Æther:Nit: ʒii.

A's Temperature.

June 4th.—At 6-30 A.M. 39·83°C.
„ „ —„ 11 A.M. 39·4°C.
„ „ —„ 7-30 P.M. 39·4°C.
„ *5th.*—„ 7 A.M. 38·75°C.
„ „ —„ 7-30 P.M. 39·83°C.
„ *7th.*—„ 6 A.M. 39·58°C.
„ „ —„ 7-30 P.M. 40·°C.
„ *8th.*—„ 6 A.M. 40·°C.
„ „ —„ 7-30 P.M. 39·4°C.
„ *9th.*—„ 6 A.M. 40·14°C.
„ *11th.*—„ 1 A.M. 39·4°C.

B's Temperature.

June 5th.— 7-30 P.M. 40·°C.
„ *7th.*— 6 A.M. 38·75°C.
„ „ — 7-30 P.M. 39·4°C.
„ *8th.*— 6 A.M. 38·8°C.
„ „ — 7-30 P.M. 40·°C.
„ *9th.*— 6 A.M. 39·4°C.
„ *11th.*— A.M. 39·4°C.

Between the 4th and 8th of June both horses A and B showed certain symptoms of Surra. On June 9th the blood was examined microscopically. A's blood was free, but B's contained a few Surra hæmatozoa; on further examination on the 10th and 11th the blood of A was found free from hæmatozoa.

On June 12th A's condition was certainly much worse with marked loss of flesh, œdema of the abdominal muscles, the swelling extending between the fore-legs, and the limbs being much swollen.

June 14th.—A was shot and buried eight feet beneath the surface of the ground.

Up to the 15th June 1892, horses C and D have shown no signs of illness; also the four or five Savárs' horses which accompanied the Shikár expedition to Dharampore between the 26th of April and May 17th and which were exposed to exactly the same influences of season, climate, &c., that A, B or C were, have remained in good health.

On the evening of June 11th horse B was sent up to the Laboratory for treatment and arrived on the morning of June 12th, 1892.

June 12th—On admission the horse appeared fatigued with the two mile walk from the Railway Station.

Pulse 60; Respirations 48. Temp. A.M. 40·3°C.

The conjunctivæ presented a yellowish tinge with numerous extravasations of blood into their substance, but there was little or no swelling of the sheath or œdema of the limbs. The animal appeared in good condition and the appetite was normal. On examination of the blood, very numerous hæmatozoa were found, active, but not of large size.

Temp. 1 P.M. 40·6°C.; 5 P.M. 40·6°C.; Pulse 64. Respirations 36.

June 13th.—Temp. A.M. 40·2°C.; Pulse 63; Respirations 33.

Appetite good. Excretions normal, hæmatozoa numerous in the blood.

Temp. 1 P.M. 40·7°C.; 5 P.M. 41·°C.; Pulse 70; Respirations 38.

June 14th.—Animal is feverish, but appetite is good. Hæmatozoa few in the blood.

Temp. A.M. 40·2°C.; Pulse 51, Respirations 33.

R. Cinchona Alkaloids (mixed). ℥i
Liq: Arsenicalis (Arsenic 16 grains) ℥iv.
Aquam ad ℥ xvi. ℥iv bis die.

Temp. 1 P.M. 40·5°C.; 5 P.M. 40·4°C. Pulse 60. Respirations 40.

15th.—Appetite appears to be falling off, the animal is not so well, hæmatozoa few in the blood.

Temp. A.M. 40·2°C.; Pulse 63. Respirations 64. Repeat Mist.

Temp: 1 P.M. 40.°C.; 5.P.M. 40·2°C. Pulse 64. Respirations 44.

16th.—The animal is not so well, swellings appearing on the hind legs, most marked above the fetlocks, also under the abdomen and on the sheath.

Temp. 39·2°C.; Pulse 60. Respirations 40.

There are few hæmatozoa in the blood.

Urine—Sp: Gr. 1,028. Is of a dirty orange colour, normal in quantity, alkaline, containing a large amount of mucus. No albumen or sugar. Heavy flocculent precipitate after filtration and on the addition of Absolute Alcohol in excess. Crystals in the deposit after standing some time are very numerous, mostly Carbonates and Oxalates, described as striated spheres, dumb-bells, custard apple in shape, custard apple dumb-bells, custard apple with what appears to be an oval nucleus and numerous sacchromyces. Fæces normal.

June 17th.—The animal appears to be falling off in condition, but appetite remains good; is dull and feverish; skin dry and hot, pulse weak, respirations increased in number, and shallow.

Temp. A.M. 40·2°C.; Pulso 60. Respirations 28.

There are few hæmatozoa in the blood. Increased Arsenic to ten grains and Alkaloids to ʒ iv in the 24 hours.

Temp. 1 P.M. 40·3°C.; 5 P.M. 39·7; Pulse 64. Respirations 60.

18th.—The animal looks a little better this morning and is still feeding well, no further change, excretions normal.

Temp. A.M. 40°C.; Pulse 60. Respirations 28. There were few hæmatozoa in the blood.

Temp. 1 P.M. 39·8°C.; 5. P.M. 40·2. Pulse 60. Respirations 40. Arsenic increased to eleven grains and the Alkaloids to five drachms in the twenty-four hours.

19th.—The animal is dull this morning, but the appetite remains fair, the œdema of the hind limbs and under the abdomen is slightly increased in quantity. The animal is still falling away in condition; excretions remain normal. Urine—Sp. Gr. 1,026, turbid orange in colour, with a greenish brown sediment, alkaline in re-action, no albumen, trace of phosphates.

Temp. A.M. 39·4°C.; Pulse 60. Respirations 36.

There are a few hæmatozoa in the blood. Arsenic increased to fourteen grains and the Alkaloids to six drachms in the 24 hours. Temp. 1 P.M. 39·7°C.; 5 P.M. 39·7°C.; Pulse 60. Respirations 28.

20th.—The animal appears dull this morning but is still feeding well, the œdema is slightly increasing; the horse lay down during the night for the first time since admission. Urine, Sp. Gr. 1,024. Is of a dirty orange colour, alkaline in re-action, containing a large quantity of mucus but no albumen. Temp. A.M. 39·4°C.; Pulse 54. Respirations 42. The blood this morning presents no signs of a hæmatozoon although three specimens were carefully examined for them. Arsenic increased to eighteen grains and the Alkaloids as before six drachms in the twenty-four hours. Temp. 1 P.M. 39·6°C.; 5 P.M. 39·6°C. ; Pulse 60. Respirations 36.

21st.—The animal appears a little better this morning, is brighter and moves about more freely, appetite good, œdema increasing in amount; the animal lay down during the night. Temp. A.M. 39·4°C·; Pulse 48. Respirations 36.

No hæmatozoa in the blood. Arsenic increased to twenty grains and the Alkaloids as before six drachms in the twenty-four hours.

Temp. 1 P.M. 39·7°C.; 5 P.M. 39·5°C. ; Pulse 56. Respirations 40. Urine, Sp. Gr. 1,022. Is dirty greenish-yellow in colour, alkaline, contains mucus but no albumen.

22nd.—The animal is dull this morning, disinclined to move; the pulse is full and frequent, skin hot and dry, œdema of sheath and hind legs also that under abdomen is considerably increased in amount. The fæces are pultaceous. Urine, Sp. Gr. 1,018, alkaline, of a cloudy yellow colour, no albumen; the animal lay down during the night.

Temp. A.M. 39·6°C.; Pulse 52. Respirations 32.

The blood is quite free from hæmatozoa. Arsenic decreased to eighteen grains and Alkaloids the same during the twenty-four hours.

Temp. 1 P.M. 39·4°C.; 5 P.M. 39·4°C. Pulse 60. Respirations 32.

23rd.—About the same; the animal has been steadily losing condition, muscles wasting and ribs showing. The appetite however has remained good, there is a slight discharge from the nose this morning; probably due to a little medicine having been coughed into it.

Horse lay down during the night.

Temp. A.M. 39·5°C. P. 42. R. 30.

Urine—Sp. Gr. 1,024. Is cloudy yellow, alkaline, no albumen. No hæmatozoa in the blood.

Arsenic decreased to sixteen grains and the Alkaloids to five drachms. A drachm of Antifebrine was given at noon to try and prevent the mid-day rise of temperature; it had, however, no apparent effect.

Temp. 1 P.M. 40. 5 P.M. 39·4. P. 56. R. 16.

24th.—There is no change; hæmatozoa are still absent from the blood.

Temp. A.M. 39·4°C. P. 52. R. 21.

Urine—Sp. Gr. 1,028. Is of a dirty orange colour, no albumen, alkaline in re-action.

Arsenic reduced to fourteen grains and the Alkaloids to four drachms. Antifebrine ʒiss. in Spt. Ætheris Nit. ℥iss. given as yesterday.

There is no apparent effect.

Temp. 1 P.M. 40·1°C. 5 P.M. 40·7°C. P. 64. R. 28.

25th.—The animal appears to be much better this morning, is brighter, and moves freely about the box and is feeding well; the œdema under the sheath and abdomen is distinctly less in amount. The discharge from the nose has disappeared; the animal lay down at night and the excretions are normal.

Temp. A.M. 39·6°C. P. 60. R. 48.

There are no hæmatozoa in the blood.

Urine—Sp. Gr. 1,022. Is of a dirty yellow colour, alkaline, but no albumen.

The Arsenic has been reduced to twelve grains, the Alkaloids to four drachms.

Temp. 1 P.M. 40·1°C. 5 P.M. 39·6°C. P. 56. R. 40.

26th.—Improved this morning, much brighter in appearance, stronger, and moves about more freely. The swellings are disappearing from the body and legs, appetite good, fairly good pulse, respirations reduced in frequency. Excretions normal. No hæmatozoa in the blood.

Temp. A.M. 39·4°C. P. 48. R. 36.

Urine—Sp. Gr. 1,026. Is dirty orange in colour, considerable amount of mucus, no albumen. Arsenic reduced to nine grains and the Alkaloids remained at four drachms.

Temp. 1 P.M. 39·5°C.

„ 5 P.M. 39·5°C. P. 52. R. 40.

27th.—The animal looks much brighter, pulse improved, stronger and more regular; the œdematous swellings continue to be absorbed, otherwise in about the same condition as yesterday.

Urine—Sp. Gr. 1,028—of a dirty orange colour, no albumen. Temp. A.M. 39°C. P. 46. R. 40. There are no hæmatozoa in the blood. The Arsenic was again increased to twelve grains and the Alkaloids remained the same.

Temp. 1 P.M. 39·4°C. 5 P.M. 39·6°C. P. 56. R. 60.

28th.—The animal is still improving, appetite is good, moves about well and is bright.

Temp. A.M. 39·1°C. P. 44. R. 36.

There are no hæmatozoa in the blood.

Urine—Sp. Gr. 1,028. Is cloudy yellow in colour, alkaline in re-action, mucus present in quantity, no albumen. Arsenic reduced to ten grains and the Alkaloids to three drachms in the twenty-four hours.

Temp. 1 P.M. 39·4°C.
" 5 P.M. 39·3°C. P. 50. R. 52.

29th.—The animal is still improving, appetite good; the horse was walked about for five minutes this morning. The visible mucous membranes are of a reddish-yellow hue and the sclerotic presents one large extravasation at its right upper and inner border of the right eye. There are no hæmatozoa in the blood.

Temp. A.M. 39°C. P. 60. R. 60.

Urine—Sp. Gr. 1,026. Is of a dirty yellow hue, alkaline, no albumen. Arsenic reduced to eight grains and the Alkaloids to two drachms in the twenty-four hours.

Temp. 1 P.M. 39·3°C.
" 5 P.M. 39·1°C. P. 52. R. 52.

30th.—The animal is considerably better this morning, much brighter, appetite good, œdema under the abdomen and on the legs is reduced in amount. The excretions are normal; was ten minutes exercised. Hæmatozoa absent from the blood.

Temp. A.M. 39·3°C. P. 48. R. 40.

Urine—Sp. Gr. 1,028. Is of a greenish-yellow colour, alkaline, no albumen. Arsenic and Alkaloids given as yesterday.

Temp. 1 P.M. 39·3°C.
" 5 " 39·4°C. P. 48. R. 56.

1st July.—The animal is looking very bright and well this morning, the appetite is good, the œdema under the abdomen has almost entirely disappeared and but little remains in the hind legs. The bowels are rather constipated, hæmatozoa absent from the blood.

Temp. A.M. 39·3°C. P. 48. R. 40.

Urine—Sp. Gr. 1,018. Is greenish-yellow in colour, alkaline, and no albumen.

Arsenic the same as yesterday. Alkaloids the same.

Temp. 1 P.M. 39·4°C.
" 5 P.M. 39°C. P. 48. R. 40.

The animal received an extra quantity of green lucerne grass and was allowed to graze on the young green grass in the compound, with a view to relaxing the bowels.

2nd.—The animal is about the same as yesterday, is bright and the appetite is good, the œdema under the belly has completely disappeared and that on the legs is scarcely perceptible. The excretions appear normal, the mucous membranes have regained their normal appearance. No hæmatozoa present in the blood.

Temp. A.M. 39·4°C. P. 48. R. 40.

Urine—Sp. Gr. 1,012. Is dirty yellow in colour, alkaline, but no albumen, phosphates.

Arsenic the same as yesterday, the Alkaloids reduced to one drachm and a half.

Temp. 1 P.M. 39·4°C.

Temp. 5 P.M. 39·3°C. P. 52. R. 44.

3rd.—The animal has slight improvement upon yesterday, appetite good, excretions normal. No hæmatozoa present in the blood.

Temp. A.M. 39·3°C. P. 48. R. 48.

Urine—Sp. Gr. 1,022. Is like green-pea soup in appearance; alkaline, no albumen.

Arsenic the same dose, Alkaloids reduced to one drachm per diem.

The animal also received Antifebrine ʒiss. Spt. Ætheris Nit. ℥iss. with a view to reducing the temperature below 39°C. if possible. The temperature, however, steadily rose during the day: the evening remission being very slight. Temp. 1 P.M. 39·7°C

Temp. 5 P.M. 39·5°C. P. 52. R. 50.

4th.—The animal is not so well this morning, being dull, the appetite however remains good, and all œdema of the abdomen, sheath and legs has completely disappeared. The bowels are slightly constipated and the fæces present a glazed appearance.

The blood contains no hæmatozoa, but presents numerous protoplasmic bodies, the red corpuscles do not collect together into rouleaux. Temp. 39·7°C. P. 44. R. 42.

Urine—Sp. Gr. 1,015. Is dirty pea-soup in colour, alkaline and no albumen.

Arsenic the same as yesterday; Alkaloids three and a half drachms. The animal also received Magnes: Sulph. ʒiv in a draught as a laxative. The animal is allowed to graze morning and evening in the compound.

Temp. 1 P.M. 39·8°C.

„ 5 P.M. 40·1°C. P. 52. R. 48.

5th.—The animal remains dull to-day. The laxative produced two fairly-soft evacuations but the fæces became slightly hard in the evening; the appetite remains good and the animal rested well during the night.

The blood contains no hæmatozoa, but there are still protoplasmic masses dotted about, although it is clearer than yesterday.

Temp. A.M. 40·1°C. P. 60. R. 44.

Urine—Sp. Gr. 1,014. Is dirty pea-soup in colour, alkaline, but no albumen is present. Arsenic same as yesterday, Alkaloids increased to six drachms.

Temp. 1 P.M. 40·5°C.

„ 5 P.M. 40·3°C. P. 64. R. 44.

The animal is still allowed to graze morning and evening in the compound.

6th.—The animal still remains dull, but the appetite is good and he lay down during the night; the bowels are somewhat constipated, and the urine, Sp. Gr. 1,014, green pea-soup in colour, alkaline, on microscopical examination was found to contain epithelial casts and a small number of red blood corpuscles. There are slight symptoms of kidney-disorder, the animal being uneasy and paddling with its hind feet. The blood contains no hæmatozoa and is much clearer, but there are some irregular amœboid bodies present.

Temp. A.M. 40·5°C. P. 51. R. 30.

The Arsenic was increased to sixteen grains during the day and the Alkaloids reduced to four drachms. Temp. 1 P.M. 40·8°C.

Temp. 5 P.M. 40·7°C. P. 64. R. 32.

7th.—The animal is very dull this morning and there is high fever; he is restless, but does not appear to be in much pain.

The appetite is poor and the visible mucous membranes are of a dirty greyish-yellow colour, the bowels slightly constipated and the fæces coated with mucus, probably indicating slight gastro-intestinal catarrh.

The urine has a Sp. Gr. of 1,012. Is green pea-soup in colour, alkaline with casts present as yesterday.

Temp. A.M. 40·8°C. P. 52. R. 28.

Arsenic increased to eighteen grains and the Alkaloids as yesterday.

Temp. 1 P.M. 41°C.

„ 5 P.M. 40·8°C.

On microscopical examination the blood is seen to separate into small irregular masses with white blood corpuscles dotted here and there between the red. In some of the masses the individual red corpuscles are distinct, but in the greater part of the specimen the red blood corpuscles appear to have run together and have either lost their individuality or it is only after very careful observation that their outlines can be made out.

The white corpuscles are not increased in number, are mostly irregular in outline and spiked like hedgehogs or echinoderms in outline, assume many shapes and some appear like ciliated epithelium.

There are also colourless corpuscles which are filled with circular bodies, presenting a double contour at their circumference.

8th.—The animal is still very dull, high fever, appetite fair, membranes of a dirty yellow colour, fæces somewhat light in colour, glairy, thickly coated with mucus. The animal, since the fever increased, has rapidly lost flesh and is now in a very poor condition.

Urine—Sp. Gr. 1,014. Is green pea-soup in colour, alkaline; casts are still numerous.

Temp. A.M. 41·1°C. P. 44. R. 11.

Arsenic was increased to twenty-two grains and the Alkaloids remained as before.

Temp. at 1 P.M. 40·8°C.
„ „ 5 P.M. 41°C. P. 52. R. 24 per minute.

The red corpuscles are certainly more normal in character, here and there forming rouleaux; the individual corpuscles can be readily made out, but there is still a tendency to liquefaction (*i. e.*), when two masses of red corpuscles part, they are each drawn out to a point at the seat of separation and the individual red corpuscles become lozenge or spindle-shaped. There are also a few highly granular bodies resembling echinoderms.

9th.—The animal is exceedingly dull this morning and has entirely lost his appetite, there is high fever, the pulse is weak and the visible mucous membranes are of a dirty yellow colour. The animal has fallen away rapidly, is uneasy and the belly is tucked up, bowels are constipated and the fæcal matter is thickly coated with mucus, probably indicating hepatic derangement due to swelling of the mucous membrane and consequent obstruction to the flow of bile from the duct. The Sp. Gr. of the urine is 1,012, dirty greenish colour, alkaline, and contains granular casts.

The large doses of Arsenic and Alkaloids have been persisted in, notwithstanding the intestinal and hepatic derangements, as it was feared that the high temperature indicated the probable return of the Surra hæmatozoon; it appears however that this is not the case and the treatment has consequently been changed.

A mild laxative consisting of—

Ol. Ricini }
Ol. Lini } āā. Partes Equales Oss.

was given and a febrifuge and annodyne consisting of R. Ext: Belladonæ ʒss.
Pot. Chlor. ʒij.
Spt. Æth. Nit. ℥i.
Spt. Ammon. Ar. ℥i Aq. ad Oss.

Temp. A.M. 40·7°C. P. 36. R. 24.
„ 1 P.M. 40·8°C.
„ 5 P.M. 40·9°C. P. 44. R. 28.

Blood still more normal in character this morning. The Surra hæmatozoa are still absent, the red corpuscles form normal rouleaux, and there are fewer protoplasmic bodies of the hedgehog or echinoderm character.

10th—.The animal is in about the same condition as yesterday; but the temperature is slightly reduced, the laxative acted rather freely, and appears to have slightly nauseated the animal as he is entirely off his feed; no further change; ordered—

R. Potass. Chlor. ʒi.
Potass. Nit. ʒi.
Spt. Ammon. Ar. ℥iss.
Spt. Ætheris: Nit. ℥iss.
Liq. Amm: Acet. ℥iij aquam ad Oss bis die sumend.

Temp. A.M. 40·1°C. P. 44. R. 20.

Urine—Sp. Gr. 1018. Is dirty greenish-brown in colour, alkaline, epithelium and casts and crystals, no bile pigment and no bile acids present.

Blood—Hæmatozoa are absent and the corpuscles form into normal rouleaux.

Temp. 1 P.M. 40·1°C.
„ 5 P.M. 39·7°C. P. 52. R. 20.

11th.—The animal is not so dull this morning and appears to be a little better. The temperature is considerably reduced, pulse improved in tone, appetite has returned.

Repeat Mixture.

Temp. A.M. 39·4°C. P. 52. R. 36.

Urine—Sp. Gr. 1,018. Is greenish-yellow in colour, alkaline, granular casts and numerous crystals present.

The blood contains no hæmatozoa.

Temp. 1 P.M. 39·1°C.
„ 5 P.M. 39·2°C. P. 52. R. 20.

12th.—The animal is better in every way this morning; the temperature remains low and the pulse has improved since yesterday, appetite good; the animal appears to be stronger and moves about more freely and lay down during the whole night; hæmatozoa absent from the blood.

Temp. A.M. 39·1°C. P. 36. R. 36.

Urine—Sp. Gr. 1,008. Is dirty greenish in colour, but not so dark as previously, alkaline in re-action, and the granular casts are present, but not so numerous as yesterday.

Temp. 1 P.M. 39·4°C.

„ 5 P.M. 39·2°C. P. 44. R. 40. Medicine twice daily as above.

13*th*.—The animal is much brighter to-day, feeding well, fæces returning to the normal condition, but still slightly coated with mucus.

Urine—Sp. Gr. 1,018. Is greenish in colour, but clearer than yesterday, alkaline, the casts are fewer in number and the colour has considerably improved.

The animal being in exceedingly poor condition, linseed 2 lbs. daily has been ordered.

Temp. A.M. 39·2°C. P. 36. R. 22.

The blood is free from hæmatozoa.

Temp. 1 P.M. 38·5°C.

„ 5 P.M. 39·1°C. P. 44. R. 32.

Medicine repeated twice daily as above.

14*th*.—The animal appears rather dull this morning, skin hot, respiration and pulse increased in frequency, the animal is in very bad condition, almost a skeleton owing to what appears to be a progressive atrophy of the muscles. Fæces are almost normal, but there is still a trace of mucus coating them.

Urine—Sp. Gr. 1,012. Remains of a greenish hue, but is undoubtedly lighter in colour and clearer than before; alkaline in re-action. The number of casts has diminished.

Temp. A.M. 39·1°C. P. 52. R. 30. The medicine is repeated twice daily.

Temp. 1 P.M. 39·4°C.

„ 5 P.M. 39·4°C. P. 48. R. 40.

15*th*.—The animal is again dull this morning, skin hot, respiration and pulse have increased in frequency since yesterday. The visible mucous membranes are of a dirty-yellowish colour and there are several small sub-conjunctival extravasations of blood. The fæces appear normal and the urine has improved in colour and the casts have considerably decreased in number. The blood is free from hæmatozoa and there are but very few protoplasmic bodies. The red corpuscles form normal rouleaux.

Temp. A.M. 39·2°C. P. 62. R. 32.

Urine—Sp. Gr. 1,018. Is of a greenish yellow colour; alkaline in re-action. Sediment presents microscopically a few casts and numerous crystals of Carbonate and Oxalate of Calcium.

Temp. 1 P.M. 39·3°C.

„ 5 P.M. 39·3°C. P. 60. R. 44.

16*th*.—The animal has improved since yesterday; temperature normal: pulse stronger and fuller; but the heart is irritable: respirations increased in frequency and breathing almost panting in character, appetite very good, eats everything and looks bright. The animal is allowed to graze about for an hour daily; fæces normal but rather soft.

Temp. A.M. 38°C. P. 46. R. 52.

Urine—Sp. Gr. 1,010. Alkaline, has returned to its normal colour, contains no casts but a few epithelial cells; also striated spheres, circular and dumb-bell crystals, but fewer in number than previously.

Temp. 1 P.M. 39·4°C.

Temp. 5 P.M. 39·3°C. P. 50. R. 58.

17*th*.—The animal looks the same as yesterday, is bright, feeds well, appears stronger and seems to be improving a little in condition. The visible mucous membranes are spotted again, small extravasations being visible on both conjunctivæ. The respirations have improved in character and are more regular than yesterday; the pulse is about the same but the heart-beat is not so irritable as it was.

Temp. A.M. 39·3°C. P. 52. R. 41.

Urine—Sp. Gr. 1,018. Is of a dirty yellow colour, is alkaline, and still presents a few casts on microscopical examination.

On examination of the coverglass specimens of the blood, one Surra hæmatozoon was observed, and this one very active in its movements. Although the specimens were very carefully searched, only this one was discovered. The red blood discs formed rouleaux and the white corpuscles appeared normal. There were however several protoplasmic bodies, some hedgehog or echinodermic in character whilst others presented long extended processes. There were as well a few irregular shaped cells, which contained circular bodies with a double contour and highly refractile. At noon, the Arsenic and Cinchona Alkaloids were again continued in the following proportions:—

R. Liq. Arsenicalis ℥ij.
Cinchona mixed Alkals. ʒij Aquam ad Oj. Ojs. bis. die. S.

The temp. at 1 P.M. was 39·5°C.

Temp. at 4·15 P.M. 39·6°C. P. 52. R. 42.

I have noticed that the animal always coughs after pricking the nose to obtain a drop of blood for microscopical examination. On questioning the Syce he says the cough only comes on a few minutes after the above trivial operation. On taking a drop of blood this afternoon, the animal again coughed; and as nothing was found on auscultation, &c., of the chest, the cough must be the result of reflex irritation. The blood was found to contain one hæmatozoon in two large coverglass preparations.

Temp. 1 P.M. 39·5°C.
" 5 P.M. 39·6°C. P. 60. R. 44.

18th.—The animal has not altered in appearance since yesterday, walks about the loose box and appears bright.

The appetite is very good. There are several large subconjunctival extravasations on each membrane. The respiration has greatly improved in character since yesterday and the pulse is reduced in frequency. The fæces are soft, but normal in appearance.

Temp. A.M. 40°C. P. 50. R. 24.

Urine—Sp. Gr. 1,012. Is yellow in colour, alkaline, contains some epithelial and granular casts, spheroidal epithelium, a few pus cells and sacchromyces. Repeat mixture. The blood contains a few hæmatozoa not so active as the single one observed yesterday. The red blood corpuscles do not form rouleaux, but are massed together, and the individual corpuscles have run into one another.

Temp. 1 P.M. 40·3°C.
" 5 P.M. 40·3°C. P. 60. R. 44.

The animal was taken out for fifteen minutes to graze in the compound, and afterwards ate all the corn and linseed.

19th.—This morning the animal is walking about his loose box in a somewhat restless condition, but is not suffering pain. Has eaten 6 lbs. of lucerne grass and some hay, but has only taken a few mouthfuls of the corn and linseed given to him. The animal was taken out for fifteen minutes and allowed to graze in the compound as usual and showed no difficulty in walking. The membranes have still the same appearance as described above, but up to the present time there is no observable swelling or œdema of the limbs, abdomen or sheath. The fæces are semi-solid in consistency, but there is no diarrhœa.

Temp. A.M. 41°C. P. 60. R. 20.

Urine—Sp. Gr. 1,012. Is of a dirty yellow colour, alkaline in re-action and contains a few casts, and round oval and radiating crystals; also a few Oxalates, no epithelium. The blood presents very numerous hæmatozoa, the red blood corpuscles all run together in masses, but there is no reduction in the amount of colouring matter.

R. Cinchona Alkaloids (mixed) ʒiij.
Liq. Arsenicalis (As. gr. vi) ℥iss.
Aquam ad Oj. bis die.

Temp. 1 P.M. 40·8°C.
" 5 P.M. 40·8°C. P. 64. R. 48.

The animal has eaten his evening ration of corn and linseed without trouble.

20th.—The animal appears somewhat dull, but the appetite has certainly improved. It has eaten all the corn and linseed given to him, also some lucerne grass and a little hay. The pulse is more frequent and thready in character than previously and the respirations jerky but less frequent. The animal lay down during the night and this morning; there is no appearance of any swelling or œdema of the abdomen or extremities.

Temp. A.M. 40·7°C. P. 64. R. 28.

Urine—Sp. Gr. 1,007. Is yellow in colour, but cloudy and the re-action alkaline; on microscopical examination a few casts were found, some loose epithelium and numerous crystals. On careful examination of the blood microscopically only two hæmatozoa were observable in two coverglass specimens and these exceedingly torpid, so that the effect of the drugs administered is well marked. The red blood corpuscles are more natural in appearance and form rouleaux. The protoplasmic bodies or masses are now absent and the white corpuscles have assumed a more healthy aspect.

The same doses of the Arsenic and mixed Alkaloids have been continued.

Temp. 1 P.M. 40·4°C. P. 64. R. 28.
" 5 P.M. 40·4°C. P. 60. R. 40.

21st.—The animal remains dull but the appetite continues as good as ever and he lies down during the night. The temperature has continued to fall and is one-fifth of a degree lower this morning and the pulse has fallen from 60 to 44 beats per minute, but intermits every now and then.

There is a complete absence of swelling or œdema from the abdomen and extremities.

The fæces are soft but healthy.

Temp. A.M. 40·2°C. P. 44. R. 28.

The Sp. Gr. of urine is 1008, cloudy yellow in colour and alkaline in re-action, becoming slightly green on standing. The blood contains no hæmatozoa and the red corpuscles form normal rouleaux.

Temp. 1 P.M. 40·6°C.

„ 5 P.M. 40·3°C. P. 56. R. 32.

22nd.—The animal still remains dull, hanging its head; appetite however remains good. The respirations have again become jerky in character, the pulse has lost its intermittence mentioned in yesterday's report, the venous circulation appears to be improved, but the superficial veins are considerably distended with blood.

There is also some regurgitation into the jugular veins which appear over full.

There are no signs of œdema nor does the animal appear to be falling away in condition or losing strength to any extent.

Temp. A.M. 40°C. P. 48. R. 25.

Urine—Sp. Gr. 1,024. Has again assumed a dirty olive green colour, is alkaline in re-action, contains a few casts, a few red blood corpuscles and the same kind of crystals as previously described, also a trace of bile pigments.

The blood is free from hæmatozoa, but there is a large increase of white corpuscles and protoplasmic bodies, present in the blood serum.

This morning the animal was given, at 9 A.M., eight grains of Arsenic and ʒii of mixed Alkaloids.

Temp. 1 P.M. 40·4°C.

„ 5 P.M. 40·6°C. P. 42. R. 28.

23rd.—There is no material alteration in the state of the animal; his appetite is good but he eats slowly. The jerky condition of the respiration has passed off as also the venous engorgement. The blood is free from hæmatozoa this morning, but there are present a large number of irregular shaped protoplasmic bodies.

Temp. A.M. 39·6°C. Pulse 48. R. 24.

Urine—Sp. Gr. 1,024. Is of a dirty greenish yellow colour, alkaline. On microscopical examination a few hyaline casts with some red blood corpuscles in their lumen also several pus cells and radiating circular $CaCo_3$ crystals and some sacchromyces. Trace of bile pigments.

Temp. 1 P.M. 40·4°C.

„ 5 P.M. 40·7°C. P. 52. R. 24.

24th.—The animal remains dull, and condition seems to be the same as yesterday, appetite remains good and the fæces normal.

Temp. A.M. 40·3°C. P. 44. R. 28. The blood contains no hæmatozoa.

The urine is a little cloudy but a very great improvement on that passed during the previous three or four days; it is of a dirty light yellow with a very slight tinge of green, alkaline in re-action. Sp. Gr. 1,006. There are no casts observable, but a few red blood corpuscles, dumb-bell and striated spheres and crystals.

Temp. 1 P.M. 40·5°C.

„ 5 P.M. 40·4°C. P. 48. R. 30.

25th.—The animal remains in the same dull condition, appetite good, fæces normal.

Temp. A.M. 40°C. P. 36. R. 15.

There are no hæmatozoa in the blood. The urine presents the colour of green-pea soup. Sp. Gr. 1,020, alkaline, microscopically it contains a few granular casts numerous CaCo3 crystals of different forms, circular, radiating, dumb-bell two forms, the custard-apple form, a few pus cells and very numerous sacchromyces. Bile pigment a trace.

Temp. 1 P.M. 40°C.

„ 5 P.M. 40°C. P. 36. R. 17.

26th.—This morning the animal is very dull and although he has taken his corn and linseed, refuses lucerne grass and hay, the visible mucous membranes are yellow and dirty in appearance, while numerous petechiæ are visible on both conjunctivæ. Fæces normal.

Temp. 40·3°C. P. 40. R. 26.

The urine is of a yellowish pea-soup colour with a Sp. Gr. of 1,016; alkaline in re-action.

There are no hæmatozoa in the blood.

On microscopical examination the urine presents a few granular casts, striated spheres, dumb-bell (2 forms) crystals of Carbonate of Calcium.

Temp. 1 P.M. 40·5°C.

„ 5 P.M. 40·6°C. P. 52. R. 32.

27th.—The animal appears to be much weaker this morning and is very dull; he did not lie down during the night and has only eaten half the ration of corn and linseed given to him. He seems afraid to move forwards, and stands with his hind quarters resting against the wall of the stable in order to steady himself and gain support.

Temp. A.M. 40·3°C. P. 64. R. 28.

The pulse is feeble, but not intermittent.

Ordered and administered at once a draught.

R. Liq. Ammon. Acet. ℥iij.
Spt. Ammon. Aromat. ℥j.
Spt. Ætheris. Nit. ℥ijss.
Aquam ad. Oj.

The urine is cloudy, of a yellow colour, certainly an improvement on that passed yesterday, Sp. Gr. 1020, alkaline.

Temp. 1 P.M. 40·6°C.

The animal has eaten a little lucerne grass during the day, but his head appears to be giving him pain.

Temp. 5 P.M. 40·4°C. P. 68. R. 40.

Reduced the amount of Cinchona Alkaloids to ʒi—Arsenic six grains same as previously.

28th.—The animal fell to the ground several times during the night, but appears to have regained the upright position without much difficulty; he presents several patches where the hair has been rubbed off. This morning he is able to stand but only with his fore-legs stretched wide apart; there is visible weakness in the hind limbs, especially the left, which is at times slightly flexed. There is no lachrymation, or muscular tremors, which one might expect and the flexors are affected in the hind limb and not the extensor muscles; it would thus appear that the partial paralysis of the hind limbs cannot be due to the amount of Arsenic. As these symptoms have been mentioned by other observers in the course of the disease and in animals not undergoing any treatment, one will most likely find, when the *post-mortem* takes place, that the symptoms are due to an effusion of fluid or jelly material into the sheath of the spinal membranes in the lower dorsal and upper lumbar region.

Temp. A.M. 39·7°C. P. 52. R. 24.

He eats little except when the grass is literally placed in his mouth, there is loss of sensation about the lips, but no paralysis of the buccinator muscle. There are no hæmatozoa in the blood. The red corpuscles form short rouleaux, and the white do not appear to be increased in number. Several protoplasmic masses are to be seen in the two preparations of blood examined and these are about twice the diameter of a white blood corpuscle. There are also a few colourless amæboid bodies which change their form rapidly, in close proximity to normal white corpuscles, which during a considerable period have been observed and have not been seen to alter at all in form. The Alkaloids and Arsenic have been discontinued and a draught of—

R. Liq. Ammon Acet.℥iij
Spt. Ammon Ar.℥i
Spt. Ætheris Nit.℥iss
Aquam ad Oj. bis. die. S.

substituted, to be administered morning and evening.

Temp. 1 P.M. 40·3°C. P. 50. R. 24.

During the day the animal has been fed every half hour and by this means has been induced to eat about 15 lbs. of lucerne grass and a few pounds (2 or 3) of crushed gram and linseed.

Temp. 5 P.M. 40·5°C. P. 48. R. 24.

Urine—Sp. Gr. 1,020. Is orange in colour but cloudy, alkaline, no albumen.

29th.—At 3 A.M. the Syce found the animal much weaker, so removed the slings, in order to allow it to lie down; it remained standing, however, until 4 A.M. Fell shortly after 4 A.M. and death took place at 4·30.

AUTOPSY at 10·30 A.M.

The body is in poor condition, but not so much emaciated as horses generally are when they have succumbed to "Surra." There is no fluid in the pleural cavities, and there are no pleuritic adhesions. The *lungs* are of a reddish pink colour fully distended with air except at certain spots which are of a dark purple colour; these are dotted over the apices of both organs, and on examination are found to be the seat of atelectasis.

There are no extravasations of blood on the surface of the organs, or caseous nodules lying under the visceral pleuræ. *On section* the tissues present a reddish pink colour and appear to be well distended with air.

The *pericardium* contains about 60 c.c. of an orange-coloured fluid, and there are no adhesions.

The heart weighs 5 lbs. 15 ozs. after removal of the contained blood and clots.

Externally there is nothing pathological to notice. The *right auricle* contains a small quantity of black semi-fluid blood; there are no sub-endocardial petechiæ. The *right ventricle* contains dark semi-fluid blood and some clots, but no petechiæ; valves normal.

The *left auricle* contains a small quantity of dark fluid blood; no petechiæ.

The *left ventricle* is almost empty, contracted, no petechiæ; mitral and aortic valves healthy.

The stomach is partially distended with semi-digested food. *On section*, the *cuticular* portion is healthy; the mucous membrane of the *villous* portion is pale, with the exception of a small patch irregular in outline about two inches in diameter, which lies midway between the cuticular boundary and the pylorus, which presents a very pale pink colour and which is due to slight congestion. There is, however, neither ulceration nor thickening of the mucous coat.

The small intestine externally appears normal. *On section* the walls are found coated with mucus and there are several (5) localized patches, made up of small round red coloured spots, each spot being about $\frac{1}{6}$th inch in diameter and the patches 1 inch to $1\frac{1}{2}$ in diameter. These are widely separated and there is no solution of continuity of the mucous membrane. No parasites of any kind were observed although their presence was carefully searched for.

Cæcum and colon are distended with green digested material. Fæces examined and the walls of the cæcum and colon carefully searched for parasites but none were found.

Liver weighs 12 lbs. and $3\frac{1}{2}$ ozs. There are two faintly-yellow patches on the convex surface of the right lobe and two on the left, somewhat raised above the level of the surrounding tissue, circular in form and varying from one inch to two inches in diameter. These are due to old localized thickening and opacity of Glisson's capsule. There are also two small cirular caseous bodies about $\frac{1}{12}$th inch in diameter, easy of enucleation. *On section* the large vessels are found to contain much blood, but the tissue on examination appears to be normal.

The spleen weighs 2 lbs. 5 ozs., is small, firm on section and contains little or no blood.

The kidneys.—The right weighs 1 lb. $12\frac{1}{2}$ ozs, the left 1 lb. 10 ozs. The capsules are easily separated, surface smooth, the superficial veins are slightly distended; but there are no petechiæ visible. On section the cortical portion of both organs presents a vertical striation, dark-red in colour, alternating with a dull white. The medullary substance is pale.

The bladder contains 1·5 litres of orange coloured urine—Sp. Gr. 1,020—alkaline, but not a trace of albumen.

Eyes.—The conjunctivæ present numerous ecchymoses of a deep purple colour, turning to claret at the edge of the patches. There are on section of the organs, neither extravasations of blood in the fundus of either eye nor signs of any having occurred at an earlier date of the disease.

Brain and spinal cord.—On opening the skull and the spinal canal the superficial veins on the surface of the brain and cord are found to be somewhat congested. The only abnormality observable is the increased amount of cerebro-spinal fluid, which has somewhat distended the lateral ventricles and caused some pressure in the spinal canal, about 75 c.c. were measured.

Remarks on the case.—On perusal of this case, it will be evident to every one that the four horses A, B, C and D were in normal health and condition up to the time of their leaving Malabár Hill on March 16th, 1892. On this date A, B and C were taken to Páli Hill, Bándra, and were watered from the wells which at that season of the year are getting low, and the water dirty and somewhat concentrated. The animal D was on the same date stabled in the Fort, Bombay. The horses A, B and C drank the above well water from March 17th to April 14th, from which date, as the water had been pronounced very bad, it was discontinued, and Vehár pipe water substituted. A became unwell on the 15th April appearing feverish; on the 26th she was quite well again and with B and C was taken on a shikár expedition, during which they were watered at rivers and wells, together with four or five sowárs' horses. During this period all these animals were exposed to exactly the same influences with regard to season, climate, feeding and watering as A, B and C were. They all worked hard in the sun between April 26th and May 17th, and during the whole of this period A was unwell, stumbling in action, feverish and losing condition; she was therefore not worked so hard as the others. On May 17th they were returned to Páli Hill; A was then feverish and unwell; she was driven a short distance and on her return appeared to be very bad and refused food; she received some febrifuge medicine. On the 23rd of May B refused his food and an eruption broke out over the whole body accompanied by fever, which continued until the 30th of the month. Between the 4th and 8th of June A and B showed symptoms of " Surra " and on the 9th the Surra hæmatozoon was detected in B's blood, but that of A was free. A's condition continued to get worse and on June 14th she was shot and buried. None of the other horses C, D or the sowárs' animals have shown any symptoms of illness; this points to the fact that the disease was contracted from the water of the Páli Hill wells between March 17th and April 14th. But unfortunately, owing to the fact of heavy rains having fallen and the wells becoming full, I was unable to find the hæmatozoon and so definitely prove that this was the case, as the previously concentrated water had become so very highly diluted. There can be no doubt that A's illness commenced on April 15th and that the first symptom noticed in B's case was the eruption of the skin. The question of the skin-eruption as a primary symptom in some cases is dealt with specially elsewhere. B was sent to the Laboratory on June 12th and it was decided to attempt curative treatment, although it was recognized that the animal had already been suffering from the disease for a period of at least twenty-three days. It was thought advisable to commence the treatment when the number of hæmatozoa in the blood should be on the decline and accordingly on the 14th June the hæmatozoa being few, treatment with Cinchona Alkaloids and Arsenic in large doses was commenced. On the 20th the hæmatozoa disappeared from the blood, but the temperature and respirations remained above normal. The general symptoms of Surra increased up to the 24th, œdema and swelling of the limbs, sheath and that under the abdomen increased in extent, the animal steadily losing condition, the muscles wasting and the gait staggering and uncertain. On the 25th the animal had decidedly improved and it was noticed that the œdema of the sheath and abdomen was distinctly less in amount; the animal seemed brighter and moved freely about the loose box. This amelioration of the symptoms was gradually progressive, and on the 2nd July the œdema under the belly had completely disappeared, whilst that on the legs was scarcely perceptible and had on the 4th completely disappeared. On the 3rd July, however, the temperature began to rise steadily and it continued high until the 9th, notwithstanding the fact that no hæmatozoa were present in the blood. During this time the animal presented symptoms which might be accounted for by the continued high temperature, although on the 6th symptoms of kidney-disorder presented themselves, followed by epithelial casts and a small number of blood corpuscles in the urine. On the 9th, there were symptoms of gastro-intestinal catarrh, and taking these complications into consideration as well as the fact that the hæmatozoa had been absent from the blood for a period of twenty days, it was decided to discontinue the Arsenic and Alkaloids entirely and a laxative and simple febrifuge was substituted. From the 10th to the 14th all went well and the animal seemed to improve, the temperature remaining low and the animal much brighter and feeding well. On the 15th, however, he was dull and the respiration and pulse had increased in frequency, the visible mucous membranes becoming of a dirty yellow colour and petechiated. On the 16th although his appearance was brighter the respirations had risen very high, and the heart's action was irritable; the symptoms of gastro-intestinal catarrh and the kidney-disorder had entirely disappeared. On the 17th the animal appeared in much the same condition, but the respirations were less although the temperature was a little higher. On this date one " Surra" hæmatozoon was discovered in two coverglass specimens of blood, and this was the first organism observed during a period of twenty-eight days. The previous treatment of Arsenic and Cinchona Alkaloids was at once resumed. On the 18th the animal had not altered much in appearance, the respirations were greatly improved in character and the pulse in frequency, but the temperature had risen. The blood contained a few hæmatozoa, but not so active in their movements as the one noticed the day before. On the 19th the condition was worse, the hæmatozoa very numerous in the blood, and the temperature much elevated, viz. 41°C. On the 20th, the appetite was normal, but otherwise the animal did not manifest any improvement; only two hæmatozoa were observed in two coverglass specimens of the blood and these were exceedingly torpid. On the 21st the hæmatozoa were entirely absent and from this date the animal appeared to be unable to throw off the effect which the return of the hæmatozoon had given rise to, and he gradually became weaker and died on the 29th of July, although the hæmatozoa were absent during the last nine days.

The points of interest in this case are :—

(i). The evidence as to the well-water being the vehicle by which the particulate contagium entered the system.

(ii). The evidence of the effect of the drugs upon the hæmatozoon, and the gradual disappearance of the œdema, &c., which resulted from their use.

(iii). The fact of the very long interval between the disappearance of the hæmatozoon from the blood and its reappearance therein is a point of the greatest importance clinically.

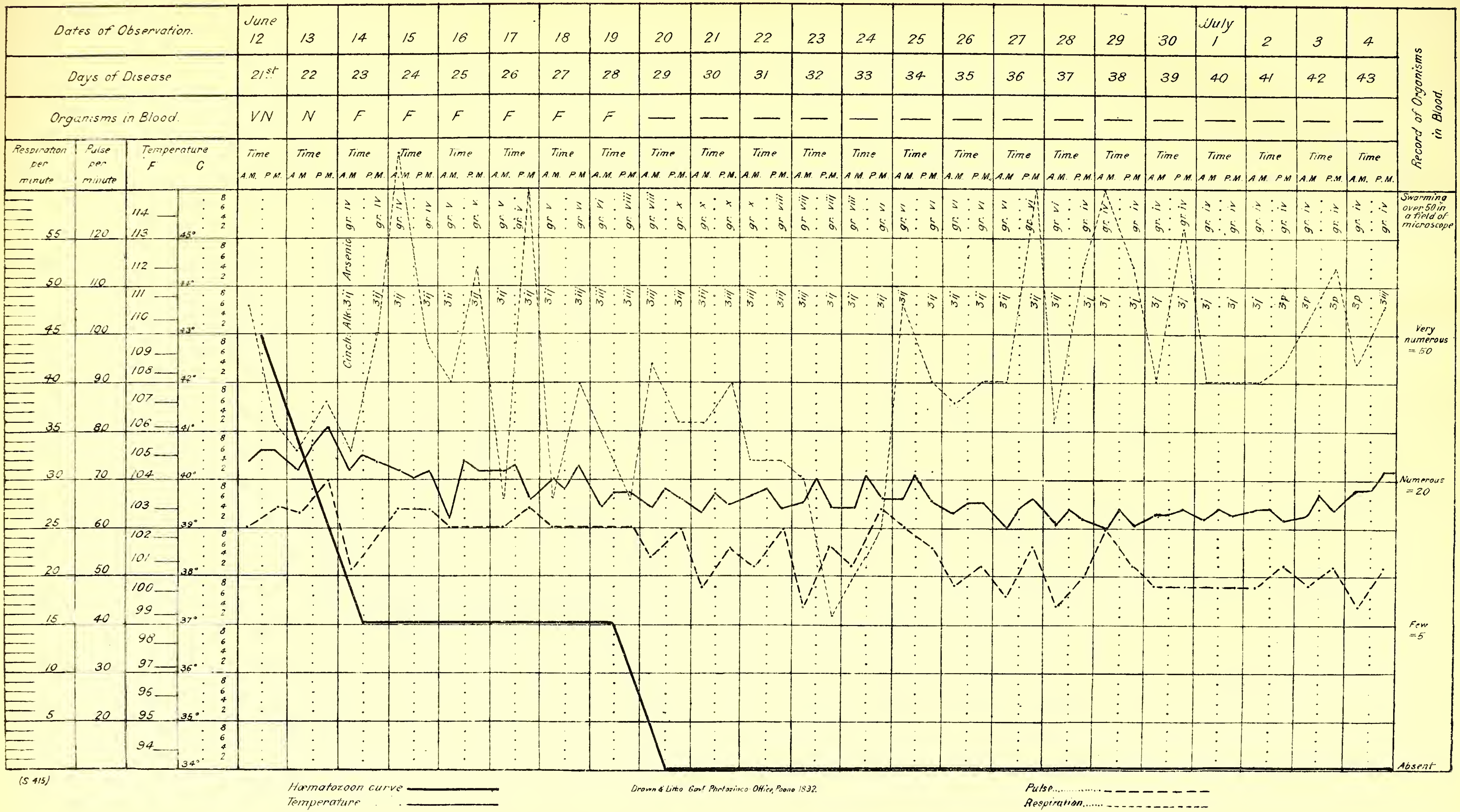
(iv). The almost absolute absence of pathological changes which were found *Post-mortem.*

Eruption, May 23rd

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Australian Gelding, treated vith Cinchona. Alkaloids and Arsenic. Age, aged. Sex, Gelding. Colour, Roan.

Disease, naturally contracted "Surra". Date of Attack, May 23rd 1892. Result, Death. Date of Result, 29th July 1892. Register No. 65. Ward



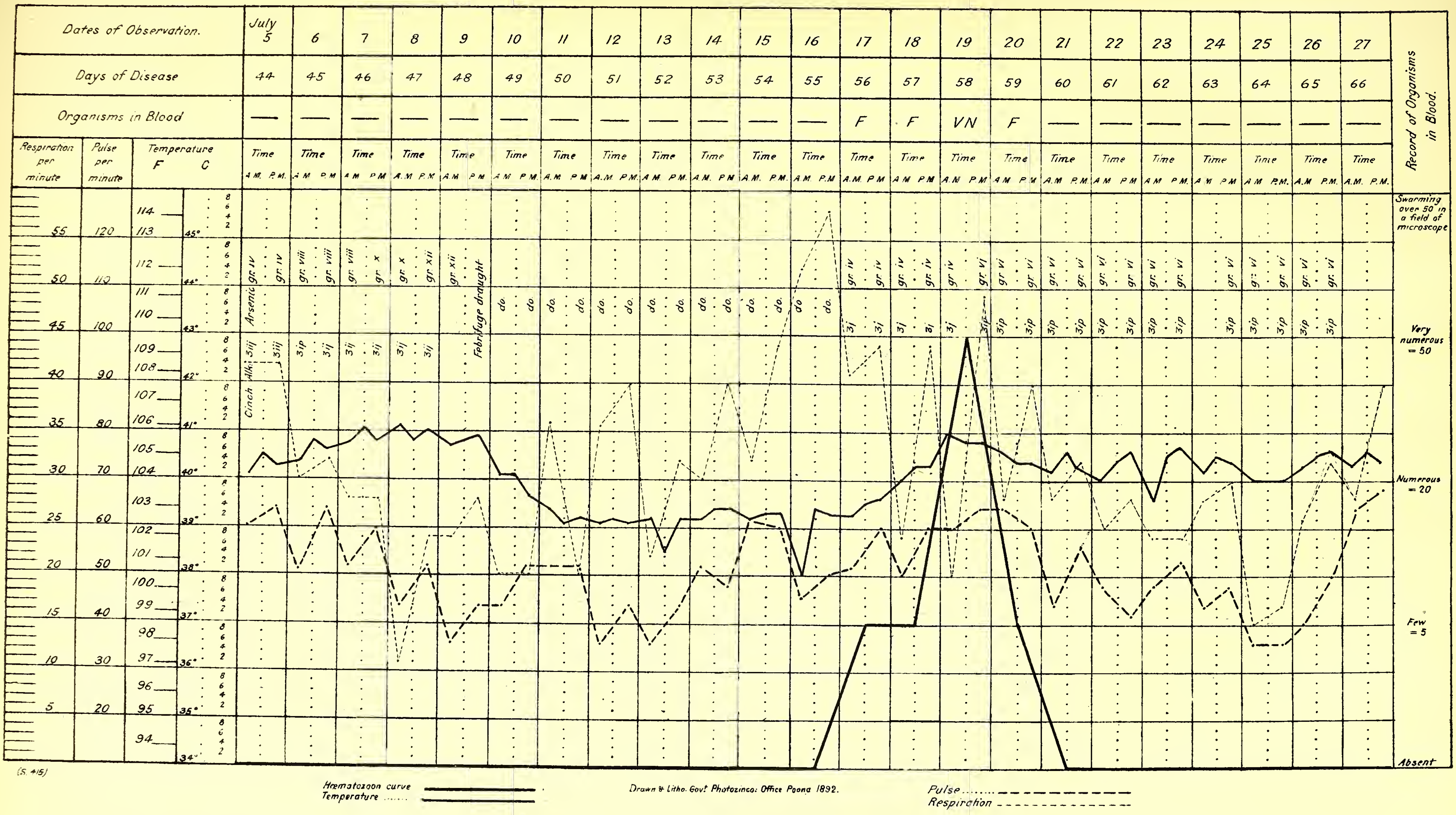
(S 415)

Drawn & Litho Govt Photozinco Office, Poona 1892.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age ______ Sex ______ Colour ______

Disease ______ Date of Attack ______ Result ______ Date of Result ______ Register No. 65



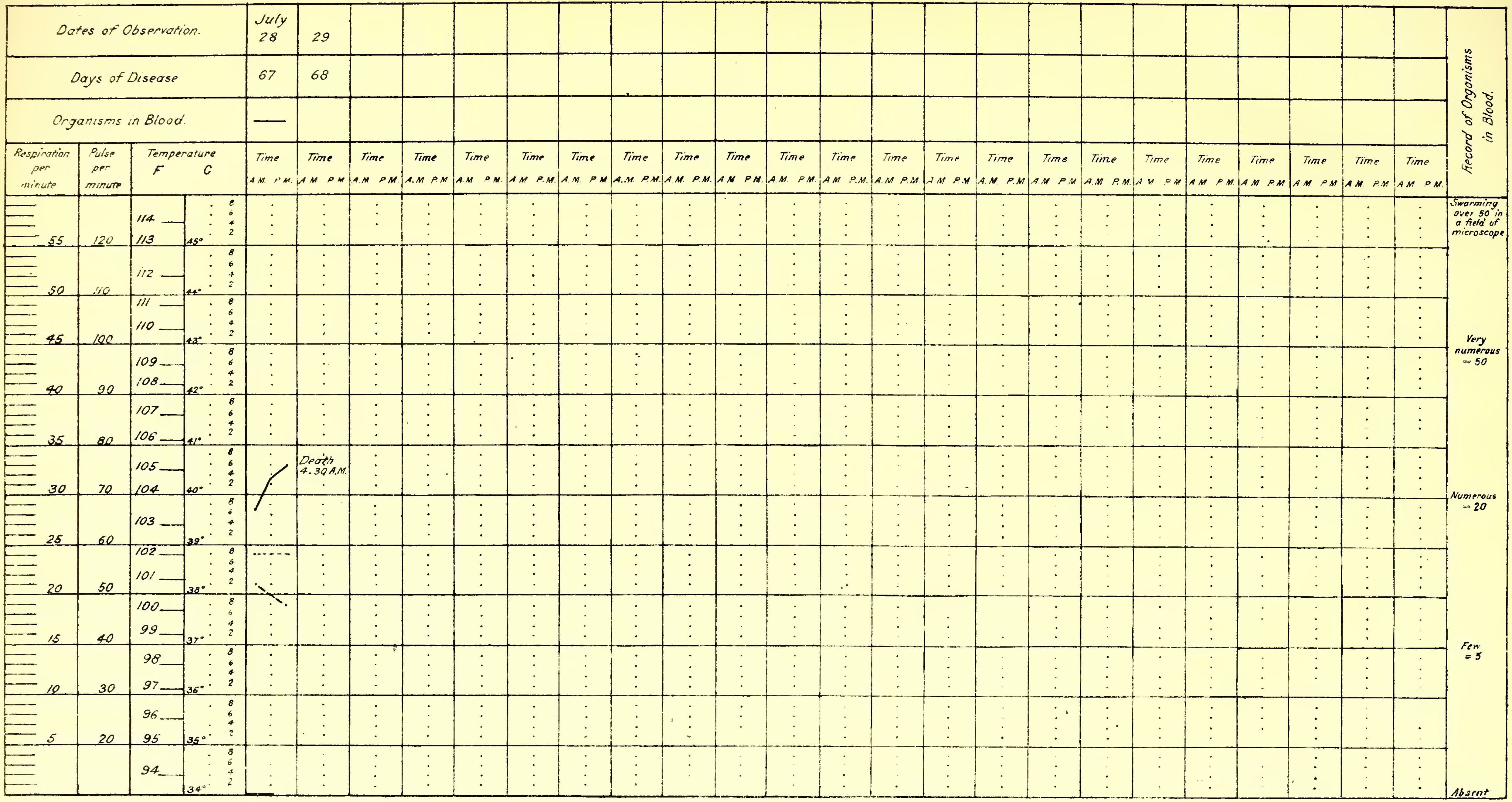
(S. 415)

Drawn & Litho. Gov^t. Photozinco: Office Poona 1892.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age ______ Sex ______ Colour ______

Disease ______ Date of Attack ______ Result ______ Date of Result ______ Register No. 65.



(S 415)

Hæmatozoon curve
Temperature

Drawn & Litho: Govt. Photozinco: Office Poona 1892.

Pulse
Respiration

RECORDS OF URINE.

Animal—Australian Roan, No. LXV. Acquired Surra 1st Symptom, 23rd May 1892. Death 29th July 1892.

Date.	Quantity.	Colour.	Re-action.	Sp. Gravity.	Albumen.	Phosphates.	REMARKS.
June 16th ..		Viscid turbid, orange..	Alkaline ..	1,028	No ..	No ..	Striated spheres, dumb-bells, custard apple, crystals of calcium carbonate, a few oxalates.
,, 19th ..		Viscid turbid, orange..	Alkaline ..	1,026	No ..	Trace ...	,, ,, ,,
,, 20th ..		Viscid turbid, orange.	Alkaline ..	1,024	No ..	No ..	,, ,, ,,
,, 21st ..		Viscid turbid, greenish yellow.	Alkaline ..	1,022	No ..	No ..	,, ,, ,,
,, 22nd ..		Viscid turbid, yellow..	Alkaline ..	1,018	No ..	No ..	,, ,, ,,
,, 23rd ..		Viscid turbid, yellow..	Alkaline ..	1,024	No ..	No ..	,, ,, ,,
,, 24th ..		Viscid turbid, orange.	Alkaline	1,028	No .	No ..	,, ,, ,,
,, 25th ..		Viscid turbid, yellow...	Alkaline ..	1,022	No ..	No ..	,, ,, ,,
,, 26th ..		Viscid turbid, orange.	Alkaline ..	1,026	No ..	No ..	,, ,, ,,
,, 27th .		Viscid turbid, orange..	Alkaline ..	1,028	No ..	No .	,, ,, ,,
,, 28th ..		Viscid turbid, yellow.	Alkaline ..	1,028	No ..	No ..	,, ,, ,,
,, 29th ..		Viscid turbid, yellow	Alkaline ..	1,026	No ..	No ..	,, ,, ,,
,, 30th ..		Viscid turbid, greenish yellow.	Alkaline ..	1,028	No ..	No ..	,, ,, ,,
July 1st ..		Viscid turbid, greenish yellow.	Alkaline ..	1,018	No ..	No ..	,, ,, ,,
,, 2nd ..		Viscid turbid, yellow..	Alkaline ..	1,012	No ..	Trace ..	,, ,, ,,
,, 3rd ..		Viscid turbid, green-pea soup.	Alkaline ..	1,022	No ..	No ..	,, ,, ,,
,, 4th ..		Viscid turbid, green-pea soup.	Alkaline ..	1,015	No ..	No ..	,, ,, ,,
,, 5th ..		Ditto ..	Alkaline ..	1,014	No ..	No.	
,, 6th ..		Ditto ..	Alkaline ..	1,014	A trace ..	No ..	Epithelial casts, red-blood corpuscles (few).
,, 7th ..		Ditto ..	Alkaline ..	1,012	A trace ..	No ..	Casts numerous.
,, 8th ..		Ditto ..	Alkaline ..	1,014	A trace ..	No .	Casts numerous.
,, 9th ..		Ditto ..	Alkaline ..	1,012	A trace ..	No ..	Casts numerous.
,, 10th ..		Viscid turbid, greenish brown.	Alkaline ..	1,018	A trace ..	No ..	Epithelium and casts.
,, 11th .		Viscid turbid, greenish yellow.	Alkaline ..	1,018	A trace ..	No ..	Casts.
,, 12th ..		Viscid turbid, greenish colour.	Alkaline ..	1,008	A trace ..	No ..	Casts.
,, 13th ..		Ditto ..	Alkaline ..	1,018	A trace ..	No ..	Casts fewer in number.
,, 14th ..		Ditto ..	Alkaline ..	1,012	A trace ..	No ..	,, ,, ,, ,,
,, 15th .		Viscid turbid, greenish yellow.	Alkaline ..	1,018	A trace ..	No ..	Casts granular, carbonate and oxalate crystals.
,, 16th ..		Viscid turbid, yellow ..	Alkaline ..	1,010	A trace ..	No ..	No casts, a few epithelium cells, and crystals.
,, 17th ..		Ditto ..	Alkaline ...	1,018	A trace ..	No ..	A few casts.
,, 18th ..		Ditto .	Alkaline ..	1,012	A trace ..	No ..	A few epithelial and granular casts.
,, 19th ..		Ditto .	Alkaline ..	1,012	A trace ..	No ..	A few casts, epithelium, crystals of carbonate and oxalate of lime.
,, 20th ..		Viscid turbid, greenish	Alkaline ..	1,007	A trace ..	No ..	A few casts, epithelium, crystals.
,, 21st ..		Light yellow	Alkaline ..	1,008	A trace ..	No ..	A few casts and crystals.
,, 22nd ..		Olive green	Alkaline ..	1,024	A trace ..	No ..	A few red-blood corpuscles, a few casts observed, carbonate of lime, oxalate of lime, &c.
,, 23rd ..		Greenish yellow ..	Alkaline ..	1,024	A trace ..	No ..	A few hyaline casts, red-blood corpuscles, epithelium, $CaCo_3$.
,, 24th ..		Light yellow with a green tinge.	Alkaline ..	1,006	A trace ..	No ..	No casts, a few red corpuscles and crystals $CaCo_3$, and oxalate Ca.
,, 25th ..		Green-pea soup.. ..	Alkaline ..	1,020	A trace ..	No ..	A few hyaline casts, $CaCo_3$, a few leucocytes.
,, 26th ..		Yellowish pea soup ..	Alkaline ..	1,016	A trace ..	No ..	A few hyaline casts, $CaCo_3$, and oxalate crystals.
,, 27th ..		Yellow	Alkaline ...	1,020	A trace ..	No ..	Absence of casts, $CaCo_3$, oxalate crystals.
,, 28th ..		Orange	Alkaline ..	1,020	No albumen.	No ..	,, ,, $CaCo_3$, oxalate crystals.
,, 29th ..	Death.						

CASE No. LXX.—GREY AUSTRALIAN GELDING, marked No. 403 on the off hind hoof, belonging to the Bombay Tramway Company, was taken into their Infirmary and placed under observation as a suspicious case on September 17th, 1892.

23rd.—Temp. 40·5°C.

24th.—Received at the Laboratory this morning. *The state on admission.*—The animal is in good condition but aged, and is suffering from the ordinary symptoms of fever and appears dull, stupid, the skin is hot and the visible mucous membranes are injected, but there are no extravasations of blood on the conjunctivæ. There is slight œdema about the fetlocks. The pulse is thready. Temp. A.M. 40°C. P. 56. R. 24. The hæmatozoa are numerous in the blood which is fairly normal in colour, the red corpuscles form natural rouleaux and are individually distinct, a few are crenated at the edges. The white corpuscles are not increased in number; there are a few lymphoid corpuscles containing one or more nuclei. The length of the hæmatozoa is considerable, the width of some appearing considerably greater than others. Some are attached in twos by their flagellated extremities. Each possesses a bright circular spot, its size being nearly half the body diameter, taken at the widest part; the wavy membrane running down the back is well marked in all the specimens observed.

Temp. 1 P.M. 39·3°C.

Urine—Turbid, orange in colour, Sp. Gr. 1,030, alkaline, contains no albumen or phosphates, but numerous crystals of Carbonate and Oxalate of Calcium. Temp. 5 P.M. 39·3°C. P. 48. R. 36.

25th.—The animal appears lively, and in fairly good health, appetite excellent, the visible mucous membranes are not of such a bright yellow as yesterday. The pulse is hard and irritable. Temp. A.M. 40·4°C. P. 56. R. 28. Hæmatozoa very numerous in the blood. Temp. 1 P.M. 40·6°C.

Urine—Turbid, orange, Sp. Gr. 1,030, alkaline, contains no albumen or phosphates, but numerous crystals of Carbonate and Oxalate of Calcium, no casts.

The treatment to be adopted in this case is the one which has been carried out with more or less marked success in the treatment of Anthrax and other blood disorders. It consists in the administration of comparatively large doses repeated at very short intervals. At 7 A.M. the horse received—

R. Acidi Carbolici (pur) ʒii.
Iodine (pur) ʒss.

Spt. Ammon. Ar. ℥i.
Ol. Lini. ℥vi. misce. ft. Mist.

At 9 A.M.

R. Acidi Carbolici (pur) ʒi.
Iodine (pur) ʒss.
Spt. Ammon. Ar. ℥i.
Ol. Lini. ℥v. misce.

This dose was repeated at 10, 11 and 12 at noon.

The blood was examined at noon and the hæmatozoa were very numerous and active. As it was deemed advisable to discontinue the administration of Ol. Lini., Glycerine and water were substituted for it, and the draught thus constituted was administered at 1-30 P.M., 2-30 P.M., 3-30 P.M., 4-30 P.M., 6-30 P.M., 7-30 P.M., 9-30 P.M., 11-30 P.M.

At 2-30 P.M. P. 60. R. 56.
„ 3-30 „ P. 60. R. 54. The animal shows no signs of discomfort.
„ 4-30 „ P. 60. R. 54. do. do.
„ 5-0 „ P. 56. R. 54. do. do.

Temp. 6 p.m. 40·6°C.

The animal up to midnight has received Acidi: Carbolici (pur), thirteen drachms (ʒxiii), Iodine pur (ʒvi) six drachms; and has shown no signs of discomfort in consequence.

26th.—The animal received the above medicine at 2 A.M. and 6 A.M. This morning the animal looks bright, and walks about freely round the loose box. The respirations are quickened, but the lungs are free from disease. The visible mucous membranes retain their yellow tinge, but there are no petechiæ on the conjunctival membranes; the pulse is strong but not hard, and the appetite is very good. The fæces are somewhat soft, but there is no diarrhœa. Temp. A.M. 40·3°C. P. 60. R. 60. The blood contains very numerous hæmatozoa. The medicine was administered at 12 noon. Temp. 1 P.M. 40·7°C. Urine, clear, non-viscid, bright yellowish-red in colour. Sp. Gr. 1,032. Alkaline, no albumen. Temp. 5 P.M. 40·3°C. P. 64. R. 56. The medicine was administered at 3 P.M., 6 P.M., 9 P.M., and at midnight.

27th.—The animal received the medicine at 6 A.M. and appears very much brighter this morning. The pulse is regular and strong, but the respirations continue frequent. The appetite is excellent and the excretions healthy in character. Temp. A.M. 40·4°C. P. 60. R. 56. The medicine was administered at 9 A.M. and at noon. The hæmatozoon is absent from the blood. The red corpuscles form groups but no rouleaux; the white are large and swollen to twice their normal size, but are not increased in number. Temp. 1 P.M. 40·6°C. Urine, turbid, viscid, orange in colour. Sp. Gr. 1,033. Alkaline, no albumen. Temp. 5 P.M. 40·3°C. P. 52. R. 60. The medicine was administered at 3 P.M., 6 P.M., and 9 P.M., but it is to be discontinued until 6 A.M. to-morrow.

28th.—The animal looks bright and well, the visible mucous membranes are clear, and the yellow tinge has almost entirely disappeared. There is slight œdema of the hind limbs; the appetite is good and the evacuations appear natural. Temp. A.M. 40. 1°C. P. 52. R. 40. The hæmatozoa are few in the blood. Temp 1 P.M. 40·4°C. Urine, turbid, viscid, greenish-yellow. Sp. Gr. 1,030. Alkaline, and contains no albumen or phosphates. Temp. 5 P.M. 40·1°C. P. 56. R. 52. Medicine was administered at 6 A.M., 9 A.M., 12 noon. Each dose containing Carbolic Acid ʒi. Iodine ʒss. The doses given at 2 P.M., 4 P.M. 6 P.M., 8 P.M. 10 P.M., 12 P.M., each contained Carbolic ʒiss. Iodine ʒss.

29th.—The general condition of the animal is unchanged. Temp. A.M. 39·3°C. P. 48. R. 44. The hæmatozoa are few and active in the blood. Temp. 1 P.M. 40·4°C. Urine, turbid, viscid, Sp. Gr. 1,030, alk. No albumen. Temp. 5 P.M. 40·2°C. P. 60. R. 48. Sixteen doses of medicine were administered during the 24 hours; each dose containing—

Acidi. Carbolici	ʒiss.
Iodine (pur)	ʒss.
Glycerine	℥i.
Aquam ad.	℥iv.

and were given at the following times—3 A.M., 6 A.M., 8 A.M., 10 A.M., 12 noon, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 P.M.

30th.—This morning the animal looks well and up to the present there appears to have been no effect produced on the general health. The visible mucous membranes look clear, and there is a complete absence of petechiæ. The appetite is excellent and the fæces normal in character. Temp. A.M. 40·6°C. P. 72. R. 48. The hæmatozoa are numerous in the blood. Temp. 1 P.M. 40·7°C. Urine, turbid, viscid, at a distance looks a brownish-black colour, when filtered, a clear sherry colour. Sp. Gr. 1,040, alkaline, on addition of Nitric Acid, turns like ink, contains Carbonate and Oxalate of Lime crystals, but no albumen. At 2-30 P.M. the animal appeared a little dull, so the medicine is to be discontinued. Ten doses, containing the same amount of each drug, have been administered since midnight, *viz.*, at 3, 6, 7, 8, 9, 10, 11 A.M., 12 noon, 1 P.M. and 2 P.M. Temp. 5 P.M. 40·7°C. P. 76. R. 48.

1st October.—The animal is slightly dull, and appears to be suffering uneasiness after taking food as evidenced by its immediately drinking water after eating. The general condition remains unchanged. The membranes however this morning are tinged yellow and present several petechiæ. Fæces are normal in character. Temp. A.M. 41·3°C. P. 68. R. 32. The hæmatozoa are absent from the blood. Temp. 1 P.M. 41·2°C. Urine, opaque, viscid, bright-yellow in colour. Sp. Gr. 1,018. Slightly alkaline, contains albumen a trace, a small amount of Carbonates. Temp. 5 P.M. 41°C. P. 56. R. 44.

2nd.—The animal is better this morning, looks brighter, and is not so uneasy; there is a slight discharge from the eyes and nose, the mucous membranes of which are injected. This is probably due to the large doses of Iodine which have been given. The conjunctivæ have lost their yellow tinge, but some petechiæ still remain upon them. The sub-maxillary lymphatic-gland on the left side is considerably enlarged, and is hard, but not painful to the touch. The pulse is much improved in character, being strong and full. The œdema of the hind limbs has slightly increased in amount and the sheath is very slightly œdematous. The condition of the animal remains unchanged. The appetite is good and the fæces normal. Temp. A.M. 39·8°C. P. 44. R. 24. The hæmatozoa are absent from the blood. Temp. 1 P.M. 40·3°C. Urine, turbid, viscid, light-yellow in colour. Sp. Gr. 1,022. Alkaline, albumen a trace, numerous crystals of Carbonate and Oxalate of Calcium. Temp. 5 P.M. 40°C. P. 44. R. 48.

3rd.—The animal appears bright and is feeding well. The visible mucous membranes are injected, and that of the left nostril is somewhat tumefied and a discharge of thick yellow material flows from it in small quantity; this gives rise to snuffling respiration. The respirations are frequent and rather hurried; the lungs being slightly congested. The right sub-maxillary gland is slightly increased in size, and the left is still free from tenderness. Temp. A.M. 40°C. P. 48. R. 36. The hæmatozoon is absent from the blood. Temp. 1 P.M. 40·2°C. Urine, turbid, cloudy-yellow in colour. Sp. Gr. 1,026. Alkaline, a trace of albumen. Temp. 5 P.M. 40·4°C. P. 48. R. 52.

4th.—The animal is much better to-day, appears bright, is feeding well, the visible mucous membranes are clear, and the discharge from nose has ceased. The snuffling respiration and the congestion of the lungs have disappeared. Temp. A.M. 40·7°C. P. 52. R. 32. The hæmatozoon has again appeared in the blood in small numbers, only one having been found in two coverglass specimens of blood. Temp. 1 P.M. 40·2°C. Urine, turbid, viscid, greenish-yellow in colour. Sp. Gr. 1,034. Alkaline, albumen a trace. Temp. 5 P.M. 40·7°C. P. 48. R. 52.

R. Cinchona Alkaloids ℥iss.
Liq. Arsenicalis ℥x.
Aquam ad. ʒxii bis. die. S.

5th.—The animal looks dull; one large petechia on the conjunctival membrane of the right eye; the membranes have assumed a yellow colour; the pulse is small and hard and very jerky; the loss of condition is becoming very evident, especially about the quarters, and the sheath is more œdematous. There is a line of ulceration running from the corner incisor teeth of the upper jaw on both sides, along the junction between the gums and the hard palate. The sub-maxillary gland continues in the same state but there is still no tenderness on pressure. The appetite remains good and the fæces are normal in character. Temp. A.M. 40·5°C. P. 52. R. 36. The hæmatozoa are few in the blood. Temp. 1 P.M., 40·4°C. Urine, viscid, turbid, orange in colour. Sp. Gr. 1,038. Alkaline, no albumen, crystals of Carbonate and Oxalate of Lime. Temp. 5 P.M. 40·4°C. P. 60. R. 36. Administered two doses of Arsenic and Cinchona Alkaloids during the 24 hours.

6th.—There is very little change in the animal's condition. Temp. A.M. 40·5° C. P. 64. R. 44. The hæmatozoa are few in the blood. Temp. 1 P.M. 40·7°C. Urine, turbid, viscid, orange in colour. Sp. Gr. 1,032. Alkaline, no albumen, crystals of Carbonate and Oxalate of Lime.

R. Liq. Arsenicalis ʒx.
Cinchona Alkaloids ʒii.
Aquam ad. ℥xii. bis. die. S.

Temp. 5 P.M. 41°C. P. 60. R. 64.

7th.—The patient this morning presents all the symptoms of high fever, the respirations are hurried and very frequent. The pulse is quick, small and hard, beating 56 to the minute. The animal appears dull and distressed; the swelling of the limbs and sheath has slightly increased in size; notwithstanding these symptoms, the appetite is remarkably good. Temp. A.M. 40·4°C. P. 56. R. 64. The hæmatozoa are few in the blood. Temp. 1 P.M. 39·8°C. Urine, viscid, turbid, greenish-yellow with a heavy sediment. Sp. Gr. 1,038. Alkaline, albumen a faint trace. Temp. 5 P.M. 39·2°C. P. 60. R. 44. The animal received two doses of the medicine during the 24 hours.

8th.—The animal is much brighter this morning, the visible mucous membranes are much cleaner and the yellow tinge is less marked. The lymphatics on the inside of both hind limbs are prominent and the fore-limbs are œdematous, hot, and painful on pressure. The pulse has improved in character, is full and stronger and hot and hard. Temp. A.M. 38·5°C. P. 56. R. 40. The hæmatozoa are absent from the blood. Temp. 1 P.M. 39·6°C. Urine, turbid, viscid, dirty orange in colour. Sp. Gr. 1,042. Alkaline, albumen absent, crystals of Carbonate and Oxalate of Calcium, no casts. Temp. 5 P.M. 39·3°C. P. 56. R. 60. Two doses of the medicine were given during the 24 hours.

9th.—The animal is again somewhat dull this morning, the skin is hot and the œdema of the extremities has increased and remains painful on pressure. The ulceration on the edge of the gums and hard palate are undergoing the healing process. The pulse is full and regular and the heart-beats very quick and irritable. Temp. A.M. 39·1°C. P. 64. R. 40. There are no hæmatozoa in the blood. Temp. 1 P.M. 40·2°C. Urine, turbid, viscid, dirty greenish-yellow in colour. Sp. Gr. 1,050. Alkaline, albumen $\frac{1}{34}$th. Temp. 5 P.M. 39·7°C. P. 64. R. 56. Two doses of medicine were administered to the animal during the 24 hours.

10th.—The animal appears somewhat brighter this morning; the pulse is full and regular, but continues hard and frequent, and there is some jugular regurgitation. The respirations are less in frequency, but the abdominal muscles are used more than is natural. The œdema of the limbs and sheath continues to increase very gradually and the loss in condition is more marked daily. The visible mucous membranes are clear and pale. Temp. A.M. 39·5°C. P. 64. R. 24. There are a few hæmatozoa in the blood. Temp. 1 P.M. 40°C. Urine, turbid, viscid, orange in colour. Sp. Gr. 1,042. Alkaline, albumen a trace. The Arsenic is to be increased to grains vi and the Cinchona Alkaloids to ʒiiss per dose. Temp. 5 P.M. 40·7°C. P. 60. R. 44. Two doses of medicine were administered during the 24 hours.

11th.—The condition of the animal is about the same as yesterday, with certain exceptions. The heart-beats are not so jerky, and the jugular regurgitation has disappeared. The œdema of the extremities still continues and is tender on pressure. Temp. A.M. 39·1°C. P. 60. R. 28. There are a few hæmatozoa in the blood. Temp. 1 P.M. 40·3°C. Urine, turbid, viscid, orange in colour. Sp. Gr. 1,044. Alkaline, no albumen, crystals of Carbonate and Oxalate of Calcium. Temp. 5 P.M. 40·4°C. P. 64. R. 52. Two doses of medicine were administered during the last 24 hours.

12th.—The animal is rather dull and the snuffling respiration continues. There is a slight discharge from the nasal passages, but the membranes are clear and present no petechiæ. The pulse is small, hard and frequent and the respirations accelerated. The animal is rapidly falling off in condition. Temp. A.M. 38·8°C. P. 64. R. 32. The hæmatozoa are absent from the blood. Temp. 1 P.M. 40·2°C. Urine, viscid, turbid, orange in colour. Sp. Gr. 1,040. Alkaline and contains albumen nil. Crystals of Carbonate and Oxalate of Calcium. Temp. 5 P.M. 39·7°C. P. 64. R. 48. Two doses of the medicine were given during the 24 hours.

13*th.*—The general condition of the animal is unchanged, with these exceptions that the discharge from the nose is less in quantity, the glands have assumed their normal size, and the membranes are clean. The appetite is very good and the fæces normal. Temp. A.M. 38·1°C. P. 48. R. 20. The hæmatozoa are few in the blood. Temp. 1 P.M. 39·1°C. Urine, turbid, viscid, orange in colour. Sp. Gr. 1,034, contains no albumen, but crystals of Carbonate and Oxalate of Calcium. Temp. 5 P.M. 39·5°C. P. 64. R. 48. The animal has had two doses of medicine during the twenty-four hours.

14*th.*—The animal is very dull and ill this morning, the respirations are exceedingly frequent; the membranes again present the yellow tinge before described, the pulse is still hard and quick; but the appetite remains good. Temp. A.M. 39·3°C. P. 64. R. 60. The hæmatozoa are numerous in the blood. Temp. 1 P.M. 40·5°C. Urine, turbid, viscid, orange in colour. Sp. Gr. 1,036. Alkaline, a faint trace of albumen, Carbonate and a considerable quantity of Oxalate of Calcium. Temp. 5 P.M. 40·4°C. P. 60. R. 48. Two doses of medicine were given during the twenty-four hours, one with the small dose as before and one with Cinchona Alkaloids ʒiii. Liq. Arsenicalis ʒxiv.

15*th.*—The animal is much worse this morning, dull and semi-somnolent, all fore-limbs are increased in size, and there is œdema appearing between the fore-legs. It is scarcely able to walk, standing uneasily and frequently changing its position; the respirations are hurried and shallow and the visible mucous membranes yellowish in colour, but there are no petechiæ. The heart-beats are violent and the shock is easily perceptible at the bottom of the trachea in front of the chest. The pulse is small and hard. Temp. A.M. 39·6°C. P. 64. R. 48. There are a few hæmatozoa in the blood. Temp. 1 P.M. 40·7°C. Urine, clear, orange. Sp. Gr. 1,032. Alkaline, contains albumen $\frac{1}{22}$nd, Carbonate and Oxalate crystals, Temp. 5 P.M. 40·8°C. P. 64. R. 60. Two doses of medicine were administered during the twenty-four hours.

16*th.*—The animal appears somewhat brighter this morning, the respirations are reduced in frequency, and the pulse is more healthy in character. It moves about with greater ease, but the œdema of the limbs continues. Temp. A.M. 39·1°C. P. 64. R. 36. The hæmatozoon is absent from the blood. Temp. 1 P.M. 39·8°C. Urine, turbid, viscid, yellow in colour. Sp. Gr. 1,038. Alkaline, albumen $\frac{1}{20}$th, crystals of Carbonate and a few Oxalate of Calcium. Temp. 5 P.M. 40·2°C. P. 64. R. 62. Two doses of medicine were administered during the 24 hours. Both contained Alkaloids ʒiii but in the second dose the Arsenic was increased from vii to viii grains.

17*th.*—The animal looks brighter, there are however fresh petechiæ on the conjunctival membranes and there is swelling and œdema of the extremities, but that of the sheath and between the fore-limbs remains as before. Temp. A.M. 39·6°C. P. 64. R. 32. The hæmatozoon is absent from the blood. Temp. 1 P.M. 40·2°C. Urine, viscid, turbid, reddish-yellow in colour. Sp. Gr. 1,029. Alkaline, contains a faint trace of albumen. Temp. 5 P.M. 40·1°C. P. 60. R. 48. The animal received two doses of the medicine during the 24 hours.

18*th.*—The animal has fallen off very much during the past few days, and looks tucked up this morning, but continues to feed well and lies down during the night. Temp. A.M. 39·6°C. P. 64. R. 40. There are no hæmatozoa in the blood. Temp. 1 P.M. 39·7°C. Urine, viscid, turbid, orange in colour. Sp. Gr. 1030. Alkaline, albumen $\frac{1}{28}$th, Carbonates and Oxalates of Calcium crystals. Temp. 5 P.M. 39·8°C. P. 64 R. 48. The animal received two doses of medicine during the 24 hours.

19*th.*—In the night this animal became weak and distressed and fell to the ground. He was unable to rise, and when lifted up in the slings, was at first unable to stand in them. After some time, however, he gained strength and stood with the assistance of the slings. He appears to be very uneasy and restless, constantly changing the weight from one leg to another. The respirations are hurried and laboured, the body is bedewed with sweats, the face bears an anxious expression. The pulse is exceedingly hard and bounding. The heart-beats are tumultuous. Temp. A.M. 39·8°C. P. 72. R. 60. The hæmatozoon is absent from the blood. Temp. 1 P.M. 40·3°C. Urine, turbid, viscid, orange in colour. Sp. Gr. 1,028. Alkaline, contains albumen $\frac{1}{20}$th and crystals of Carbonate and Oxalate of Calcium. The animal's condition became gradually worse and at 3·30 P.M. he was unable to stand in the slings, so was allowed to lie down. He gradually became weaker, and there being no hope of his rallying, Chloroform was administered, death taking place at 5 P.M.

AUTOPSY at 6 P.M.

The body is somewhat emaciated, all the four extremities are swollen and œdematous. There is a layer of yellow jelly-like exudation over the sternum, but the under-surface of the abdomen is free from it.

Thorax.—There is no fluid in the pleural cavities and there are no pleuritic adhesions.

Lungs.—The lungs are fully filled with air and are the seat of some localized emphysema at the apices and present a pale pink colour over their entire surface, and there is a total absence of blood extravasations. There are however a few hard calcareous bodies lying near the surface of the organs under the visceral pleuræ. On section, the tissues appear healthy.

The pericardium contains a few ounces of a somewhat turbid, orange-coloured fluid.

Heart.—Externally the base is the seat of yellow exudation and is dotted over with numerous small petechiæ, especially in the sulcus between the right auricle and ventricle; the muscular structure is however quite free from them. *On section,* the *Right auricle* is found to contain a few dark red clots, otherwise it presents a perfectly normal appearance. The *Right ventricle* contains some fluid blood and clots, but there are no sub-endocardial ecchymoses visible. One curtain of the inter-auriculo-ventricular valve, lying in apposition to the interventricular septum, presents an extravasation, dark purple in the centre, with a lighter pink zone surrounding it 1¼″ × ½″ the surface of which appears roughened or granular, but on lifting up the valve, it is found not to implicate the external surface of it. The *Left auricle* is empty, but the endocardial lining presents a very white appearance, but is found to be perfectly smooth when the hand is passed over it. There are two small sub-endocardial ecchymoses very dark in colour, circular in form, ⅛″ in diameter one on each of the muscular masses of the musculi-papillares, and there are also a few lying under the endocardium, but covered by the chordæ tendineæ and the lower portion of the right curtain forming the mitral valve; the other curtain presents a few small ecchymoses on its inner surface. The *aortic* and *pulmonary* valves are healthy.

Abdominal cavity.—The peritoneal cavity is free from fluid.

Stomach.—Distended with food. *On section,* the *cuticular* portion is healthy; the *villous* portion presents at about its centre, between the line of demarcation and the pylorus, a tumour 4″ × 2″ × 1″ with an opening leading into the interior, due to *Spiroptera megastoma*; on section, a large cavity is found lying in the subcutaneous tissue beneath the thickened mucous membrane, and contains some purulent material which has a very offensive smell.

Liver.—The capsule presents several circumscribed white-coloured patches, due to old perihepatitis. There are no caseous nodules visible on the surface, or on section of the organ; the tissues appear healthy.

Spleen is enlarged and weighs 3 lbs. 4 ozs. There are a few ecchymoses dotted over the surface of the capsule, but on section, the tissues are found to be firm and present a healthy appearance.

Kidneys.—The capsules strip easily, and present a perfectly healthy appearance on section.

Small intestines.—The surface of the mucous membrane is coated with a light yellow coloured viscid material, but the membrane itself presents a perfectly healthy appearance throughout its whole length.

Large intestines.—There are a few small circumscribed patches of congestion in the cæcum and colon but no ulceration. Also a few parasites (Strongylus armatus).

Rectum presents three small circumscribed patches, ⅓″ in diameter, somewhat red in colour, about two feet from the anus, but there is no sign of any ulceration.

Remarks.—This animal belonged to the Bombay Tramway Company and was taken into their Infirmary and placed under observation as a suspicious case on September 17th, 1892. On the morning of the 23rd September 1892, the Surra hæmatozoon was found on microscopical examination of the blood. At the present time the cause of this outbreak is involved in obscurity, as every known possible precaution is taken by their able Managing Director, who is fully alive to the importance of and takes the keenest interest in the subject.

The animal was taken in the Laboratory Hospital on September 24th. From the symptoms exhibited, it appeared that the disease was in a somewhat advanced stage and the attack was a severe one. On microscopical examination of the blood, it was found to contain numerous "Surra" hæmatozoa.

It was decided in this case to endeavour to destroy the organism by the exhibition of large and frequently repeated doses of an antiseptic, pushing it if necessary to such a degree as to cause toxic symptoms in the animal, but stopping short of causing actual poisoning. Carbolic Acid and Iodine, mixed in a suitable vehicle, were the agents selected, as it is said that in some cases of specific disease their use has been attended with marked success.

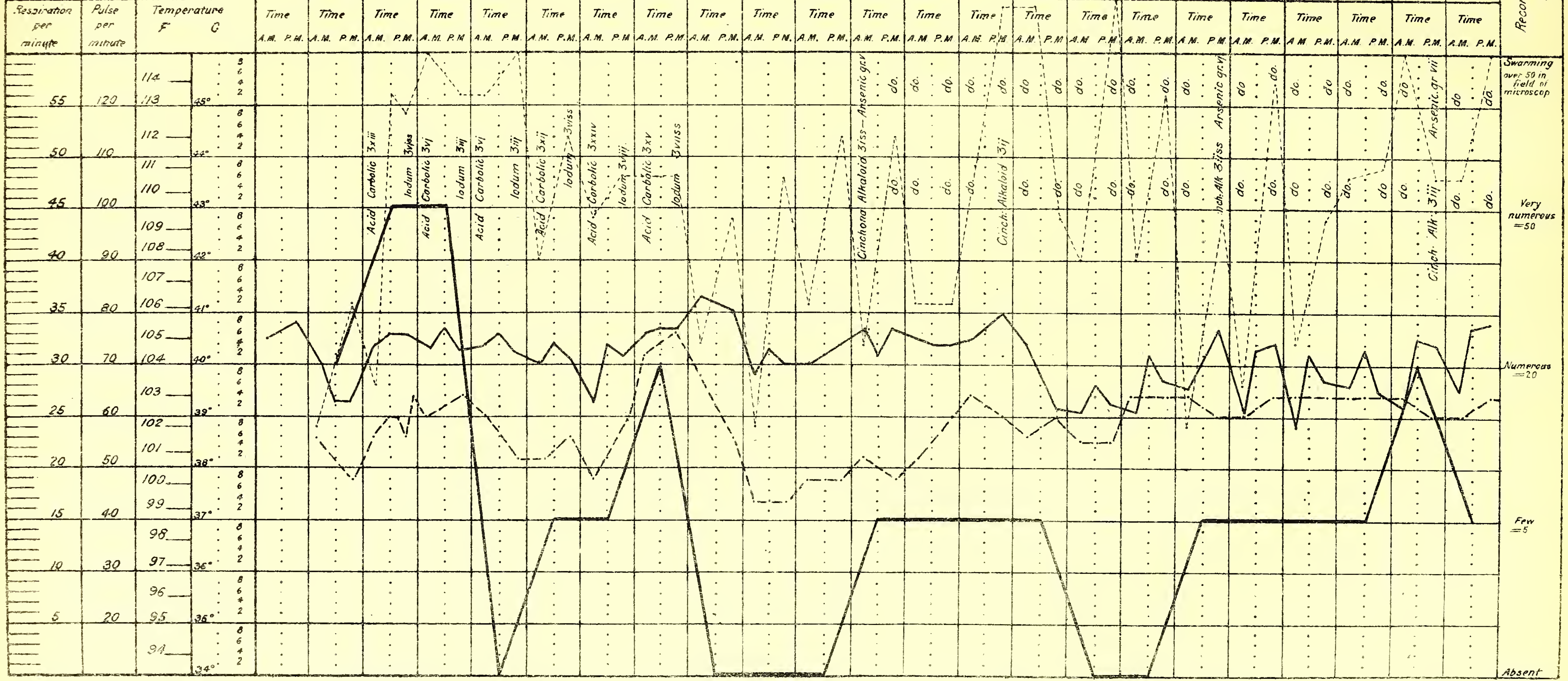
The method adopted in the administration of the drugs was to be one calculated to insure the absorption of them in comparatively small but gradually increasing quantity. With this end in view, on September 25th two drachms of Carbolic Acid and half a drachm of Iodine were administered as a first dose, and followed at intervals of an hour by one drachm of Carbolic Acid and half a drachm of Iodine. The animal up to the morning of the 26th had received Carbolic Acid, fifteen drachms, and seven of Iodine. This amount of the drugs produced no untoward symptoms, beyond an increase in the number of respirations. On microscopical examination of the blood, very numerous hæmatozoa were found. During the rest of the day, the animal received four drachms of Carbolic, and two drachms of Iodine. On themorning of the 27th, it appeared better, but the respirations still remained high.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Australian Gelding — Age, Aged — Sex, Gelding — Colour, Grey

Disease, "Surra" naturally acquired — Date of Attack, 23rd Sept. 1892 — Result, Death — Date of Result — Register No. LXX.

Dates of Observation.	Sept. 23	24	25	26	27	28	29	30	Oct. 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Days of Disease	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Organisms in Blood.		N	VN	VN	—	F	F	N	—	—	—	F	F	F	F	—	—	F	F	F	F	N	F



(S. 415)

Hæmatozoon curve ————
Temperature. ————

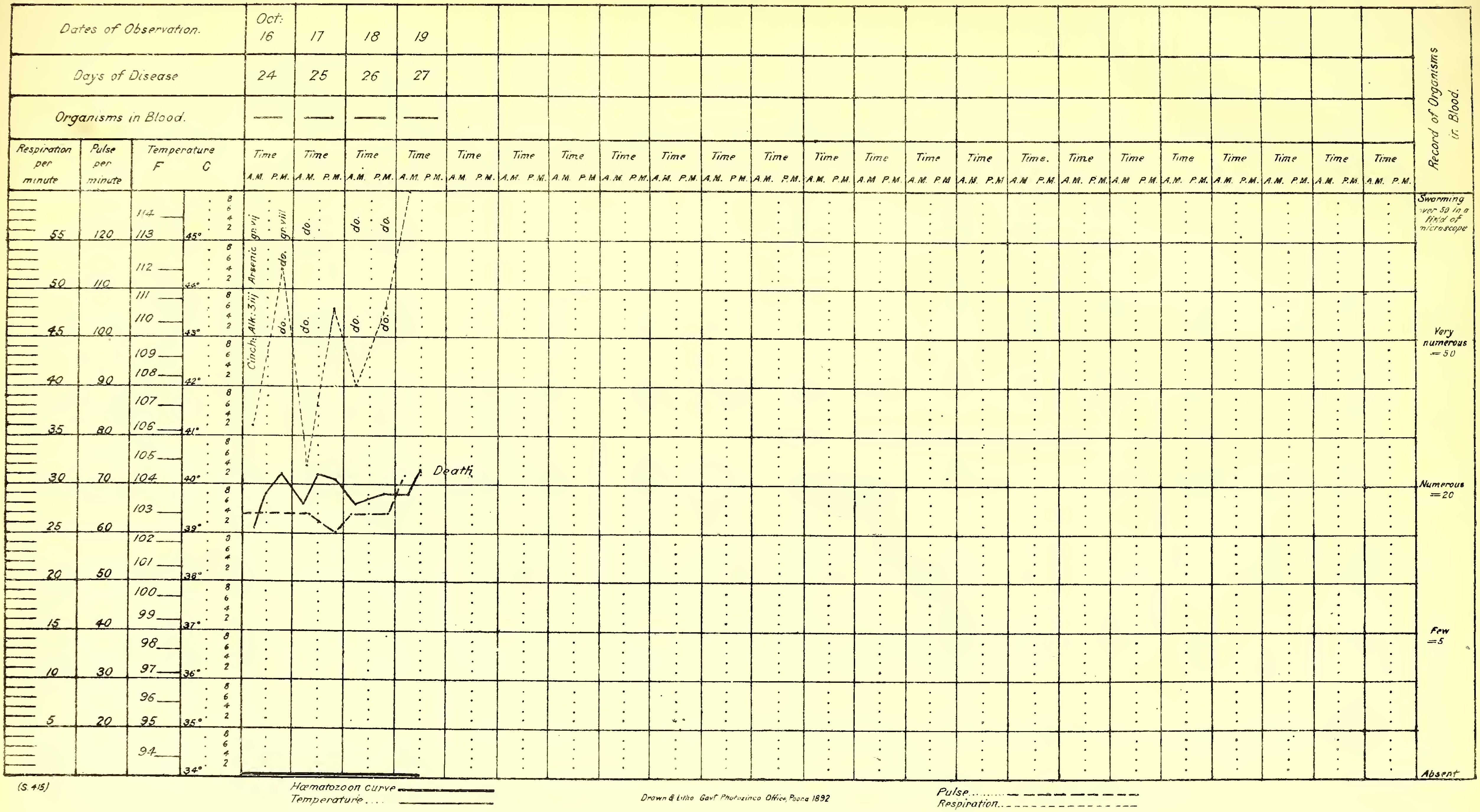
Drawn & Litho. Govt. Photozinco. Office, Poona 1892.

Pulse — — — —
Respiration - - - - -

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age, Sex, Colour,

Disease, Date of Attack, Result, Date of Result, Register No., L X X.



(S. 415)

Drawn & Litho Govt Photozinco Office, Poona 1892

No hæmatozoa were discovered in the blood on microscopical examination, but we were unable to decide whether this absence was the result of the treatment, or whether it was one of the natural phases of the disease. It was, therefore, resolved to continue the medicine, and the horse received, during the day, Carbolic Acid ʒvi and Iodine ʒiii.

On the morning of the 28th, the animal looked bright and well, the number of respirations had decreased considerably, but a microscopical examination of the blood revealed the presence of a few hæmatozoa. The amount of Carbolic Acid and Iodine was, therefore, increased, twelve of the former and six and a half drachms of the latter were administered during the day. From the 29th, the general condition of the animal was unchanged and there were few and active hæmatozoa in the blood. The amount of the medicine was, therefore, again increased, the animal receiving Carbolic Acid ʒxxiv and Iodine ʒviii. On the 30th, no effect appeared to have been produced on the health of the animal by the drug, the appetite and general appearance being as before. The only effect noticed being in connection with the urine, which assumed a brownish-black colour, and exhibited an inky line on the addition of a small quantity of Nitric Acid to it. On microscopical examination of the blood, the organisms were found to be numerous. The animal received, during this day, Carbolic Acid ʒxv and Iodine ʒviiss. On October 1st, the animal showed the first symptoms which might be referred to the action of the drugs, appearing slightly uneasy after taking food. On microscopical examination of the blood, no hæmatozoa were detected. Taking into consideration the symptoms evinced by the animal, it was decided to discontinue the administration of the medicine, as it was deemed to have had a fair trial in the case; when it is considered that the administration of pure Carbolic Acid seventy-six drachms and Iodine thirty-two drachms produced so little effect on the organisms, it will appear to be evident that their use as remedical agents in this disease is of little practical value. From October 1st to the 4th no organisms were detected in the blood, the uneasiness passed off, and no further effect of the medicine was noticeable. On the morning of the 4th October, a few hæmatozoa were discovered in the blood, and it was consequently decided to again adopt treatment with Cinchona Alkaloids and Arsenic. Accordingly Cinchona Alkaloids ʒiss and Arsenic grs. iv were given twice during the day, and these doses were continued until the evening of the 6th, when they were increased to two drachms and five grains respectively, and these doses were continued until the evening of the 10th, when they were again increased to two and a half drachms and six grains respectively, and continued until the evening of the 14th, when they were increased to three drachms and seven grains, and on the evening of the 16th, the Arsenic was increased to eight grains. The disease continued to steadily progress during this time, and very little effect was produced upon the temperature.

The hæmatozoa during the period of the latter course of treatment were few for the first four days, then absent for two days, again being few for four days, numerous for one, again few for one day and then absent for four days from the blood, when death took place.

RECORDS OF URINE.

Animal—Grey Australian Gelding, No. LXX, date, September 24th. Disease—Surra, naturally acquired.

Date.	Quantity.	Colour.	Re-action.	Sp. Gravity.	Albumen.	Phosphates.	Remarks.
Sep. 24	...	Turbid orange	Alkaline ...	1,030	No albumen.	No ...	Carbonates and oxalates of lime, no casts.
25	...	Turbid orange	Alkaline ...	1,030	No albumen.	No ...	Carbonates and oxalates of lime, no casts.
26	...	Turbid orange	Alkaline ...	1,032	No albumen.	No ...	Carbonates and oxalates of lime, no casts.
27	...	Turbid orange	Alkaline ...	1,033	No albumen.	No ...	Carbonates and oxalates of lime, no casts.
28	...	Viscid, greenish yellow .	Alkaline ...	1,030	No albumen.	No ...	Carbonates and oxalates of lime, no casts.
29	...	Viscid, greenish yellow .	Alkaline ...	1,030	No albumen.	No ...	Carbonates and oxalates of lime, no casts.
30	...	Turbid, brownish black.	Alkaline ...	1,040	No albumen.	No ...	Carbonates and oxalate crystals, no casts.
Oct. 1	...	Turbid, viscid, bright yellow.	Alkaline ...	1,018	A trace ...	No ...	Small amount of carbonates, no casts.
2	...	Turbid, viscid, bright yellow.	Alkaline ...	1,020	A trace ...	No ...	Small amount of carbonates, no casts.
3	...	Turbid, viscid, bright yellow.	Alkaline ...	1,026	A trace ...	No ...	Increase in the amount of carbonates, no casts.
4	...	Turbid, viscid greenish yellow.	Alkaline ...	1,034	A trace ...	No ...	Carbonates and oxalates of calcium, no casts.
5	...	Viscid, turbid orange ...	Alkaline ...	1,038	No albumen.	No ...	Carbonates and oxalates of calcium, no casts.
6	...	Viscid, turbid orange ...	Alkaline ...	1,032	No albumen.	No ...	Carbonates and oxalates of calcium, no casts.
7	...	Viscid, turbid, greenish yellow.	Alkaline ...	1,038	Faint trace .	No ...	Carbonates and oxalates of calcium, no casts.
8	...	Viscid, turbid, dirty orange.	Alkaline ...	1,042	No albumen.	No ...	Carbonates and oxalates of calcium, no casts.
9	...	Viscid, turbid, greenish yellow.	Alkaline ...	1,050	Albumen 1/34th	No ...	Carbonates and oxalates of calcium, no casts.
10	...	Turbid, viscid orange ...	Alkaline ...	1,042	A trace ...	No ...	Carbonates and oxalates of calcium, no casts.
11	...	Turbid, viscid orange ..	Alkaline ...	1,040	Absent ...	No ...	Carbonates and oxalates of calcium, no casts.
12	...	Turbid, viscid orange ...	Alkaline ...	1,040	A trace ...	No ...	Carbonates and oxalates of calcium, no casts.
13	...	Turbid, viscid orange ...	Alkaline ...	1,034	A trace ...	No ...	Carbonates and oxalates of calcium, no casts.
14	...	Turbid, viscid orange ...	Alkaline ...	1,036	A trace ...	No ...	Carbonates and a considerable quantity of oxalates.
15	...	Viscid, clear orange ...	Alkaline ...	1,032	1/22nd ...	No ...	Carbonates and oxalates of calcium, no casts.
16	...	Viscid, turbid yellow ...	Alkaline ...	1,038	1/20th ...	No ...	Carbonates and a few oxalate of calcium, no casts.
17	...	Viscid, turbid, reddish yellow	Alkaline ...	1,029	A trace ...	No ...	Carbonate and oxalate of calcium crystals.
18	...	Turbid, viscid orange ...	Alkaline ...	1,030	1/28th ...	No ...	Carbonates and oxalates of calcium, no casts.
19	...	Turbid, viscid orange ...	Alkaline ..	1,028	1/20th ...	No ...	Carbonates and oxalates of calcium, no casts.

CASE No. LXXI.—AUSTRALIAN ROAN MARE, *aged.*—Disease recognised as "Surra," on the 23rd September. September 24th 8 A.M., reached the Laboratory. *State on admission.*—In good condition, conjunctival membranes tinged yellow in colour with several petechiæ dotted over them of a deep red colour; mucous membrane of mouth yellow in colour and pasty; nasal membranes slightly injected; skin cool; slight œdema of the fetlocks. Temp. A.M. 40°C. P. 40. R. 16. The blood is pale in colour, the red corpuscles are indistinct and run together; the white corpuscles are swollen and granular, but are not increased in number; a few masses of spiculated protoplasm are dotted over the specimens and also a few round cells containing smaller bodies. The hæmatozoa are numerous but appear smaller than those observed in the blood of Case No. LXX this morning. Temp. 1 P.M. 40·3°C., 5 P.M. 40·3°C. P. 44. R. 40.

25th.—Animal appears very dull, hanging head, disinclined to move, legs slightly swollen and œdematous. Pulse thready and frequent. Visible mucous membranes dirty yellowish-red colour, marked with several small extravasations. Feeding well. Temp. A.M. 40·6°C. P. 40. R. 24. Hæmatozoa very numerous in the blood. Temp. 1 P.M. 40·5°C. Urine, clear, viscid, yellowish red in colour. Sp. Gr. 1,029. Alkaline, no albumen.

It is decided to treat this case with Arsenic and the mixed Cinchona Alkaloids in small doses—

R. Cinchona Alkaloids ʒi.
Liq. Arsenicalis ℥i.
Aquam ad ℥xii bis die.

Temp. 5 P.M. 40·6°C. P. 48. R. 36.

26th.—The animal looks much brighter; the petechiæ on the conjunctival membranes still retain their dark red colour. The pulse is weak and irregular. The appetite however remains very good. Temp. A.M. 39·2°C. P. 44. R. 20. The hæmatozoon is absent from the blood; the red corpuscles form healthy rouleaux, the white are granular and increased in size, but not in number. The open spaces between the corpuscles are occupied by a dense network of fibrine. Temp. 1 P.M. 39·3°C. Urine, none could be obtained. Temp. 5 P.M. 38·3°C. P. 40. R. 24. Two doses of the medicine have been administered during the 24 hours.

27th.—This morning the animal looks much brighter and walks freely about the box. The œdema of the lower extremities is still present especially between the hocks and fetlocks of the hind limbs. The petechiæ on the conjunctival membranes are disappearing. The animal feeds well and the excretions appear normal. Temp. A.M. 38·7°C. P. 40. R. 36. The hæmatozoon is absent from the blood; the red corpuscles present a healthy colour and form normal rouleaux and the white appear normal. Temp. 1 P.M. 39·3°C. Urine, none could be obtained. Temp. 5 P.M. 39°C. P. 38. R. 36. Two doses of the medicine were given during the twenty-four hours.

28th.—There is no change in the general condition of the animal. She feeds well and the excretions are healthy looking. Temp. A.M. 39·2°C. P. 40. R. 24. The hæmatozoon is absent from the blood. Temp. 1 P.M. 39·3°C. Urine, opaque, viscid, greenish yellow in colour. Sp. Gr. 1,036. Alkaline. Temp. 5 P.M. 39·3°C. P. 44. R. 24. Two doses of the medicine were administered during the day.

29th.—The animal appears very bright and healthy with the exception of a slight œdema of the fetlocks. The visible mucous membranes are clear, and there are no petechiæ on the conjunctival membranes. The character of the pulse has improved. The appetite is excellent and the evacuations healthy. Temp. A.M. 37·6°C. P. 44. R. 36. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·6°C. Urine, opaque, viscid, greenish yellow in colour. Sp. Gr. 1,046. Alkaline, heavy sediment on standing ⅔ of the whole; large numbers of Calcium Carbonate and Oxalate crystals, albumen a trace. Temp. 5 P.M. 38°C. P. 40. R. 28. Two doses of medicine have been administered, one at 8 A.M. and 5 P.M.

30th.—The condition of the animal is unchanged. Temp. A.M. 38°C. P. 40. R. 28. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38°C. Urine, none could be obtained.

Temp. 5 P.M. 37·6°C. P. 44. R. 32. Two doses of the medicine have been given during the day.

1st October.—The animal appears to be much in the same condition; the conjunctival membranes are injected, but no petechiæ are present. The appetite is excellent. Temp. A.M. 38·5°C. P. 36. R. 32. There are a few hæmatozoa in the blood. Temp. 1 P.M. 39·2°C. Urine, none could be obtained, as the animal only urinates during the night. Temp. 5 P.M. 39·1°C. P. 36. R. 20. Two doses of the medicine were administered during the 24 hours.

2nd.—This morning the animal does not appear to be quite so lively as yesterday. There are a few petechiæ on the conjunctival membranes. The skin is rather hot. There are no other symptoms noticeable. Temp. A.M. 39·3°C. P. 48. R. 32. The hæmatozoa are few in the blood, but rather more numerous than they were yesterday. The dose of the several drugs has been increased, *viz.* :—

R.	Liq. Arsenicalis	ʒx.
	Cinchona Alkaloids	ʒiss.
	Aquam ad	℥xii.

Temp. 1 P.M. 40°C. Urine, none could be obtained. Temp. 5 P.M. 40°C. P. 36. R. 16. Two doses were administered during the 24 hours; the first as before, the second containing the increased doses of Arsenic and Cinchona Alkaloids.

3rd.—The animal is in about the same state as yesterday. The mucous membranes are a little injected. Temp. A.M. 39·3°C. P. 40. R. 28. The hæmatozoa are however very numerous in the blood. Temp. 1 P.M. 41°C. Urine, turbid, viscid, yellow, Sp. Gr. 1,026. Albumen $\frac{1}{18}$th.

Temp. 5 P.M. 40·3°C. P. 40. R. 32. Two doses of medicine were administered during the 24 hours.

4th.—The animal looks in the same state as yesterday, except that the conjunctival membranes present numerous petechiæ. The appetite is however very good. Temp. A.M. 40·8°C. P. 48. R. 28. The hæmatozoa are numerous in the blood. Temp. 1 P.M. 40·3°C. Urine, turbid, viscid, cloudy yellow in colour. Sp. Gr. 1,028. Alkaline, albumen $\frac{1}{20}$th. Carbonates, no phosphates. Temp. 5 P.M. 39·2°C. P. 40. R. 24. Two doses of the medicine were administered to-day.

5th.—The animal looks and is a great deal better to-day. The petechiæ on the conjunctival membranes have faded somewhat in colour and no fresh ones are present. The appetite continues excellent and the fæces are natural in character. Temp. A.M. 40·3°C. P. 40. R. 24. The hæmatozoa are few in the blood. Temp. 1 P.M. 40·8°C. Urine, none could be collected. Temp. 5 P.M. 40·8°C. P. 44. R. 36. Two doses of medicine were administered during the 24 hours.

6th.—The animal is very much better this morning, the œdema of the extremities has decreased. The visible mucous membranes are clear; the appetite good, and fæces normal in character. Temp. A.M. 37·6°C. P. 36. R. 24. The hæmatozoa few in the blood. Temp. 1 P.M. 38·5°C. Urine, none collected. Temp. 5 P.M. 38°C. P. 32. R. 32. Administered two doses of medicine during the 24 hours.

7th.—The animal is bright and looks perfectly well this morning. The visible mucous membranes are quite clear, and there are no petechiæ on the conjunctival membranes. The pulse is strong and regular, and the œdema of the lower portion of the extremities is a little less. The appetite is very good and the fæces normal in character. Temp. A.M. 38°C. P. 40. R. 32. There are however a few hæmatozoa in the blood. Temp. 1 P.M. 39·8°C. No urine could be collected. Temp. 5 P.M. 38·7°C. P. 40. R. 28. The medicine was administered twice during the 24 hours, the last dose of Alkaloids being increased to two drachms.

8th.—This morning there is an Urticarial eruption not particularly well marked except on the inside of the thighs and especially on the left one. There are a few wheals on the neck and back, but none on the quarters; otherwise the condition of the animal is quite unchanged. The appetite remains very good. Temp. A.M. 38·5°C. P. 40. R. 28. The hæmatozoa are numerous in the blood. Temp. 1 P.M. 39·8°C. Urine, turbid, viscid, greenish yellow in colour. Sp. Gr. 1,038. Alkaline, contains a faint trace of albumen, with crystals of Carbonate and Oxalate of Calcium, but no casts. Temp. 5 P.M. 40°C. P. 48. R. 28. Two doses of the medicine were administered during the 24 hours.

9th.—The animal is feverish this morning, the skin is hot, the visible mucous membranes injected, and there is one large petechia on the right conjunctiva. The extremities are also slightly more swollen and œdematous than yesterday. Temp. A.M. 39·7°C. P. 52. R. 36. There are a few hæmatozoa in the blood. Temp. 1 P.M. 40°C. Urine, turbid, viscid, orange in colour. Sp. Gr. 1,030. Alkaline, contains albumen $\frac{1}{30}$th, crystals of Carbonate and Oxalate of Calcium. Temp. 5 P.M. 39°C. P. 40. R. 24. Two doses of the medicine were administered twice during the 24 hours.

10th.—The animal is much brighter this morning. The temperature has fallen during the night, one and a half degrees. The pulse is however irregular, weak and occasionally intermittent. The œdema of the extremities continues unchanged, and there is progressive wasting of the muscles noticeable. Temp. A.M. 37·5°C. P. 36. R. 24. The hæmatozoa continue few in the blood. Temp. 1 P.M. 39·2°C. Urine, none was collected. Temp. 5 P.M. 39·6°C. P. 44. R. 28. Two doses of the medicine were administered during the 24 hours. The Arsenic is to be increased to gr. vi and the Alkaloids to ʒiss per dose.

11th.—The animal appears dull and bad, but nevertheless continues to feed well. There is no change in the general condition since yesterday. Temp. A.M. 40°C. P. 44. R. 32. There are a few hæmatozoa in the blood. Temp. 1 P.M. 41°C. Urine, turbid, viscid, yellowish brown. Sp. Gr. 1,040. Alkaline, albumen faint trace, crystals of Carbonate and Oxalate of Lime. Temp. 5 P.M. 38·5°C. P. 40. R. 32. Two doses of the medicine were administered during the 24 hours.

12*th.*—The animal is much brighter this morning owing no doubt to the sudden fall in her temperature. nearly four degrees since mid-day yesterday. The pulse continues to be small and weak, but normal as regards frequency. There are no petechiæ on the conjunctival membranes, the animal nevertheless is gradually losing flesh. The appetite is very good. Temp. A.M. 37·1°C. P. 86. R. 24. The hæmatozoa are absent from the blood. Temp. 1 P.M. 38·5°C. Urine, turbid, viscid, brownish in colour. Sp. Gr. 1,042. Alkaline, and contains a trace of albumen. Temp. 5 P.M. 38°C. P. 40. R. 22. Two doses of medicine were administered to the animal during the 24 hours.

13*th.*—This morning the animal is very bright and lively and has improved in every way. Temp. A.M. 37·8°C. P. 60. R. 40. The hæmatozoa are again absent from the blood. Temp. 1 P.M. 38·5°C. No urine collected. Two doses of the medicine were administered during the 24 hours. Temp. 5 P.M. 38·4°C. P. 36. R. 20.

14*th.*—The condition is unchanged. The membranes are cleaner than previously. Temp. A.M. 38·5°C. P. 36. R. 36. One hæmatozoon was observed in two coverglass specimens of blood examined. Temp. 1 P.M. 38·7°C. Urine, turbid, highly viscid, yellowish brown in colour. Sp. Gr. 1,034. Alkaline, contains no albumen, but crystals of Carbonates but no Oxalates. Temp. 5 P.M. 38·4°C. P. 36. R. 16. The Cinchona Alkaloids have been increased to ʒiii per dose, and Liq. Arsenicalis ʒxiv. Two doses of medicine were administered during the 24 hours; one as per previous prescription, and one with the dose increased.

15*th.*—The condition of the animal is unchanged. Temp. A.M. 38·4°C. P. 36. R. 24. The hæmatozoa are few in the blood. One hæmatozoon was observed in two coverglass specimens. Temp. 1 P.M. 39·1°C. No urine was collected. Temp. 5 P.M. 38·8°C. P. 36. R. 28. Two doses of medicine were administered during the 24 hours.

16*th.*—The condition of the animal is unchanged. Temp. A.M. 39·2°C. P. 36. R. 20. The hæmatozoon is absent from the blood. Temp. 1 P.M. 39·2°C. No urine was collected. Temp. 5 P.M. 38·7°C. P. 40. R. 20. Two doses of medicine were administered.

17*th.*—The animal appears bright and well, and feeds as usual. Temp. A.M. 38·5°C. P. 44. R. 16. The hæmatozoon is absent from the blood. Temp. 1 P.M. 39·1°C. No urine was collected. Temp. 5 P.M. 38·6°C. P. 40. R. 20. Two doses of medicine were given during the twenty-four hours.

18*th.*—The condition of the animal is unchanged. Temp. A.M. 38·4°C. P. 40. R. 28. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·7°C. No urine collected. Temp. 5 P.M. 39·4°C. P. 40 R. 20. Two doses of medicine were administered during the twenty-four hours.

19*th.*—The condition of the animal is unchanged. Temp. A.M. 38·4°C. P. 40. R. 20. The hæmatozoa are absent from the blood. Temp. 1 P.M. 39·2°C. Urine, turbid, viscid, greenish orange in colour. Sp. Gr. 1,040. Alkaline, albumen absent, crystals of Carbonate and Oxalate of Calcium. Temp. 5 P.M. 39·2°C. P. 44. R. 24. The animal received two doses of medicine during the twenty-four hours.

20*th.*—The animal appears bright and well, and the general condition is unchanged. Temp. A.M. 38·4°C. P. 36. R. 24. The hæmatozoon is absent from the blood. Temp. 1 P.M. 39°C. No urine was collected. Temp. 5 P.M. 39°C. P. 44. R. 16. One dose of medicine was given during the twenty-four hours.

21*st.*—The general condition of the animal is unchanged with the exception of one small petechia on the left conjunctival membrane. Temp. A.M. 38·6°C. P. 44. R. 16. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·4°C. No urine was collected. Temp. 5 P.M. 38·6°C. P. 40. R. 24. The animal received two doses of medicine during the twenty-four hours.

22*nd.*—The general condition of the animal remains unchanged, except that there appears to be very slight progressive wasting of the tissues. Temp. A.M. 38·6°C. P. 56. R. 24. The hæmatozoon is still absent from the blood. Temp. 1 P.M. 39°C. Urine, none collected. Temp. 5 P.M. 39·6°C. P. 42. R. 28. The animal received two doses of medicine during the twenty-four hours.

23*rd.*—The general condition of the animal is unchanged; she appears bright and the appetite is excellent. Temp. A.M. 38·4°C. P. 40. R. 28. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·6°C. Urine, turbid, viscid, brownish yellow in colour. Sp. Gr. 1,042. Alkaline, no albumen, crystals of Carbonate and Oxalate of Calcium. Temp. 5 P.M. 39°C. P. 48. R. 16. Two doses of medicine were administered during the twenty-four hours.

24*th.*—The condition of the animal is unchanged. Temp. A.M. 38·4°C. P. 36. R. 24. The hæmatozoon is absent from the blood. Temp. 1 P.M. 39°C. Urine, none was collected. Temp. 5 P.M. 38·8°C. P. 44. R. 16. Two doses of medicine were administered during the twenty-four hours.

25*th.*—The condition of the animal is unchanged. Temp. A.M. 39·4°C. P. 48. R. 24. The hæmatozoon is absent from the blood. Temp. 1 P.M. 39·5°C. Urine, turbid, viscid, greenish yellow in colour. Sp. Gr. 1,036. Alkaline, no albumen, crystals of Carbonate and Oxalate of Calcium. Temp. 5 P.M. 39·8°C. P. 52. R. 32. Two doses of medicine were administered during the twenty-four hours.

26th.—The animal is very dull this morning and is off her feed; the visible mucous membranes are injected, but there are no petechiæ on the conjunctival membranes. There is however a patch of œdema on the right side of the abdomen, the size of the palm of the hand. Temp. A.M. 39·2°C. P. 44. R. 20. The hæmatozoon is absent from the blood. Temp. 1 P.M. 39·5°C. Urine, none collected. Temp. 5 P.M. 40·6°C. P. 56. R. 20. One pint of linseed oil was administered in the morning, and the animal received two doses of medicine in the twenty-four hours. The animal ate corn and linseed this evening as usual.

27th.—At 6 A.M. this morning the animal was found to be suffering apparently from slight abdominal pain, getting up and lying down frequently but not struggling or evincing any symptoms of acute pain. She was able to rise easily. At 8 A.M., the temp. (40·2°C.), pulse (44) and respirations (12) were taken and the animal stood during this time. Immediately afterwards she lay down and remained perfectly quiet in the normal recumbent position. At 10-45 A.M. the attendant who was watching her reported that she suddenly fell over on to the side and shot all the four limbs straight out, involuntarily passed fæces and urine, and was found to be dead.

Urine, turbid, viscid, orange in colour, Sp. Gr. 1,030. Alkaline, contains albumen a trace, crystals of Carbonate and Oxalate of Calcium.

AUTOPSY at noon, 27th October 1892.

The body is somewhat emaciated, and there is slight swelling and œdema of the extremities. *On section,* there is a small quantity of gelatinous material over the sternal region.

Thorax.—There is no fluid in the pleural cavities, and there are no pleuritic adhesions. The larynx presents a healthy appearance. The *trachea* presents a patch of congestion on its convex surface, lying underneath the mucous membrane, 3″ × 1½″ midway between the larynx and the bifurcation of the bronchi. The lumen of the lower portion of the tube is filled with frothy mucus.

Lungs.—Both apices are the seat of a slight localized emphysema. The anterior and inferior portions of both organs present a dark-red colour and are the seat of consolidation. The posterior portions are pale in colour, and there are no sub-pleural petechiæ present. The organs are also free from concretions. *On section,* the consolidated portions are found to be the seat of broncho-pneumonia. The posterior portions are filled with blood, and on pressure blood-stained mucus exudes from the cut surfaces.

Pericardium contains a few ounces of an amber-coloured fluid, but there are no petechiæ on the internal surface of the parietal portion of the sac.

The pulmonary arteries are quite free in their whole course and from the right ventricle to the periphery of the lung contain semi-fluid blood, but no clot of any kind.

Heart weighs 6 lbs. 9 ozs. Externally the base is surrounded by yellow-coloured jelly-like exudation, and there are a few, very small ecchymoses dotted over it. The muscular structure is pale in colour, but is quite free from ecchymoses.

On section—

The *Right Auricle* contains some dark-coloured recent clots. There are no sub-endocardial petechiæ.

Right Ventricle contains dark-coloured, recent clots. No sub-endocardial petechiæ.

The pulmonary and tricuspid valves are healthy.

Left Auricle is empty and healthy in appearance.

Left Ventricle is contracted; the walls measure 2¼ inches in thickness, and contains dark-coloured clots, but no sub-endocardial petechiæ.

The mitral and aortic valves are healthy.

The *Abdominal* cavity is free from fluid, and the surface of the intestines presents a healthy appearance.

Stomach is greatly distended and measures 45 inches in circumference at the line of demarcation of the cuticular with the villous portion. On section, it is found to contain a large quantity of semi-digested food, chiefly corn and linseed. The cuticular portion is white in colour and presents a normal appearance. The mucous membrane of the villous portion is slightly thickened, and presents several circular, somewhat raised, whitish-coloured patches, the size of four-anna pieces, five or six in number, which give one the idea of their having been produced by being touched with some corrosive fluid, but there is no sign of ulceration.

Liver is enlarged and somewhat dark in colour; it weighs 14 lbs. The anterior surface presents several circular yellow-coloured patches of thickened capsule, about one to one and a half inches in diameter, and some signs of old perihepatitis. There are no concretions on the surface; on section, the tissues are filled with blood, but appear healthy.

Spleen is normal in size, but is dotted over with small extravasations of blood, which lie under the capsule, and present a red-brick colour. On section, the tissues are firm and healthy in appearance.

Kidneys.—The right weighs 1 lb. 10½ ozs. and left 1 lb. 11½ ozs. The capsules strip easily. There are no petechiæ on the surface of the organs and *on section,* the tissues appear perfectly healthy.

Small Intestines healthy.

Large Intestines. Cæcum and Colon contain 16 specimens in all of the *Strongylus armatus.*

Nasal fossæ.—The mucous membrane covering the turbinated bones presents a dark-red or almost black appearance, but the membrane is only a little, if at all, increased in thickness.

Brain.—The dura-mater is healthy in appearance. There are some small patches light-red in colour merely of congestion with no effusion of blood under the visceral layer of the arachnoid.

The *Lateral Ventricles* are normal in size and do not contain any appreciable amount of fluid.

Spinal Cord normal in appearance.

Remarks.—This animal belonged to the Bombay Tramway Company and the case was recognized as one of Surra on the morning of the 23rd September 1892, on the discovery of the hæmatozoon in the blood. The mare was taken into the Laboratory Hospital on September 24th when she appeared to be in good condition, but showed unmistakable symptoms of the disease, and on microscopical examination of the blood hæmatozoa were found to be numerous in it.

It was decided in this case to again try the effect of the mixed Cinchona Alkaloids and Arsenic on the hæmatozoon, as it had shown promise of efficacy in that of Horse No. LXV in which case, after a short exhibition of the drugs, the hæmatozoon was kept in subjection for a period of 27 days. Consequently as a fresh trial was resolved upon, the animal was first put upon small doses, beginning with one drachm of the Alkaloids and four grains of Arsenic given in the form of the Liquor Arsenicalis. On the morning following the first dose, the temperature was found to have fallen over a degree and the hæmatozoon was absent from the blood, the temperature remained low and the organism absent for the next five days, during which period two doses of the medicine were administered daily. On reference to the chart, it will be seen that on the 9th day of the disease the hæmatozoon again appeared in the blood, consequently on the 10th the doses of Alkaloids and Arsenic were increased to one and a half drachms and five grains respectively; these were continued for a period of eight days, during which time the hæmatozoon varied in numbers between few and very numerous. On the 18th day of the disease a further increase in the doses was agreed upon and during the next four days they were put up to Alkaloids two and a half drachms and Arsenic grs. vi. and for the latter half of this period the organism was absent from the blood, but re-appeared on the 22nd day and remained on the 23rd at few. On the former date the Alkaloids were increased to drs. iii and the Arsenic to grs. viii and from the 23rd to the 35th day of the disease, on which latter date the animal succumbed, the hæmatozoon was entirely absent from the blood.

During the thirty-two days the animal was under treatment, three hundred and fifty-five grains of Arsenic in the form of Liquor Arsenicalis and one hundred and fifty-four and a half drachms of the mixed Cinchona Alkaloids were administered.

RECORDS OF URINE.

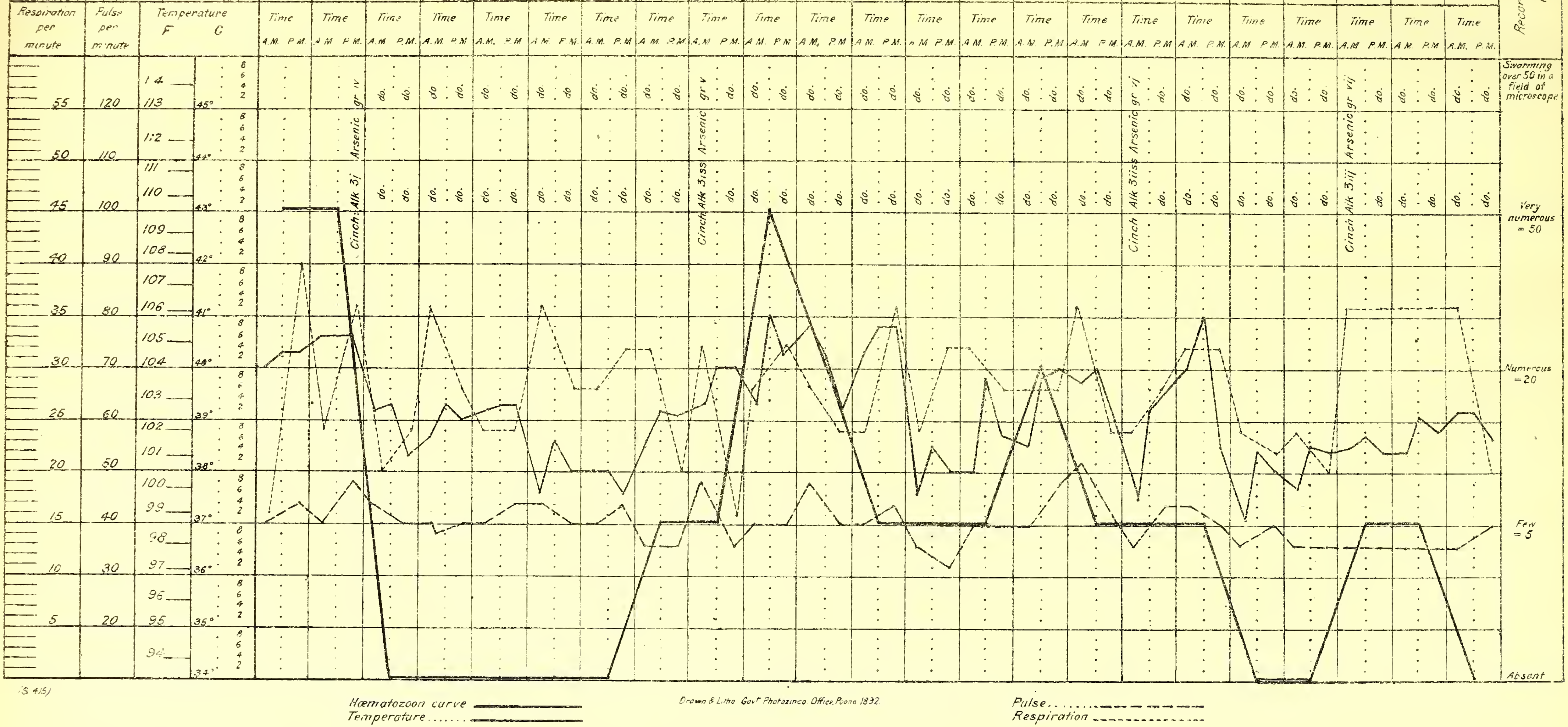
Animal, Roan Mare, No. LXXI. Date, September 24th, 1892. Disease Surra, naturally acquired.

Date.	Quantity.	Colour.	Re-action.	Specific Gravity.	Albumen.	Phosphates.	Remarks.
1892.							
September 24th	......	Clear, yellowish-red ...	Neutral ...	1,029	1-17th ...	Nil ...	Carbonates and oxalates of calcium crystals. No casts.
25th.	......	Do. ...	Alkaline ...	1,029	1-17th ...	,, ...	,, ,,
29th.	......	viscid, turbid greenish-yellow.	,, ...	1,046	A trace ...	,, ...	,, ,,
October 4th.	......	Viscid, turbid yellow ...	,, ...	1,028	1-20th ...	,, ...	,, ,,
8th.	......	Viscid, turbid greenish-yellow.	,, ...	1,038	Trace ...	,, ...	,, ,,
9th.	......	Viscid, turbid orange ...	,, ...	1,030	1-30th ...	,, ...	,, ,,
11th.	......	Viscid, turbid yellowish-brown.	,, ...	1,040	A trace ...	,, ...	,, ,,
12th.	......	Viscid, turbid brown ...	,, ...	1,042	,, ...	,, ...	,, ,,
14th.	......	Viscid, turbid yellowish-brown.	,, ..	1,034	Absent ...	,, ...	,, ,,
19th.	......	Viscid, turbid greenish-orange.	,, ...	1,040	,, ...	,, ...	,, ,,
21st.	......	Viscid, turbid greenish-orange.	,, ...	1,039	,, ...	,, ...	,, ,,
23rd.	......	Viscid, turbid brownish-yellow.	,, ...	1,042	,, ...	,, ...	,, ,,
25th.	......	Viscid, turbid greenish-yellow.	,, ...	1,036	,, ...	,, ...	,, ,,
27th.	......	Turbid, viscid-orange...	,, ...	1,030	A trace ...	,, ...	,, ,,

Australian Mare. Age, Aged. Sex, Mare. Colour, Roan.

Disease, "Surra" naturally acquired. Date of Attack, Sept. 23 1892. Result, Death. Date of Result, 27 Oct. 1892. Register No. LXXI

Dates of Observation	Sept. 24	25	26	27	28	29	30	Oct. 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Days of Disease	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Organisms in Blood	VN	VN	—	—	—	—	—	F	F	VN	N	F	F	F	N	F	F	F	—	—	F	F	—

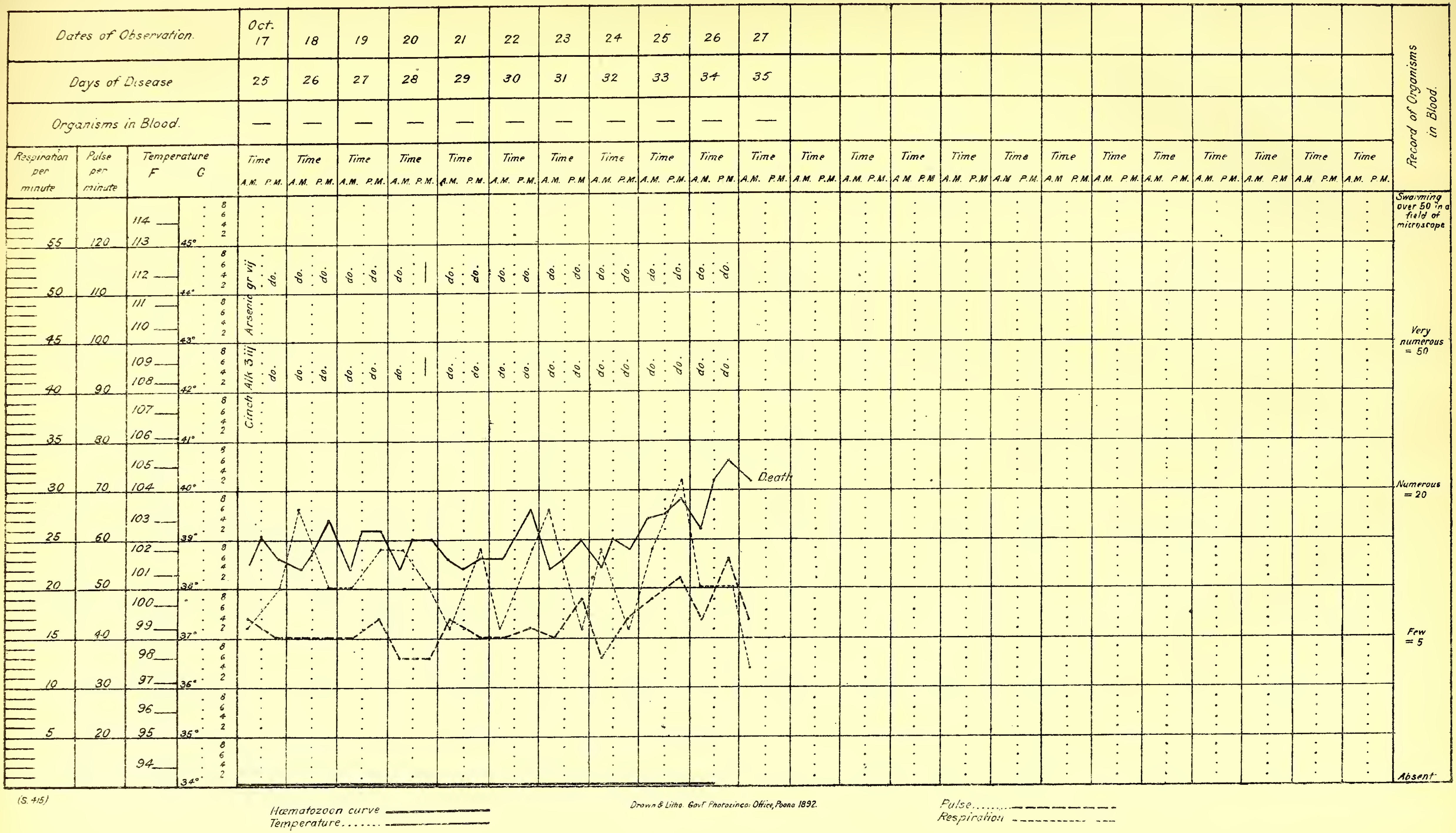


(S 415)

Drawn & Litho Govt. Photozinco Office, Poona 1892.

Age ______ Sex, Mare ______ Colour, Roan

Disease ______ Date of Attack ______ Result ______ Date of Result ______ Register No. LXXI



(S. 415)

Drawn & Litho. Govt. Photozinco. Office, Poona 1892.

CASE No. LXXII.—BAY AUSTRALIAN GELDING.—*The hæmatozoon was first discovered in the blood on the 7th October.*

9th October 1892.—*On admission.*—The animal appears to be in perfect health, and in splendid condition. The temp., pulse and respirations are normal, and the visible mucous membranes present a healthy colour. Temp. A.M. 38·8°C. Pulse 40. Resp. 20. The hæmatozoon was noticed for the first time in small numbers in the blood on the 7th instant, but to-day is absent.' Temp. 1 P.M. 39·6°C. No urine collected. Temp. 5 P.M. 39·1°C. Pulse 48. Resp. 40.

10th.—This morning the animal appears bright but there are large petechiæ on the conjunctival membranes; the visible mucous membranes are clean and healthy. Temp A.M. 39°C. Urine, none collected. Pulse 44. Resp. 28. The hæmatozoa are swarming in the blood. Temp. 1 P.M. 40·4°C.

R. Potass : Chlor. ʒiss.
Potass : Nit. ʒiss.
Spt : Ammon : Ar. ℥i.
Liq : Ammon : Acet. ℥iv.
Spt : Ætheris Nitrosi ℥iss.
Aquam ad Oj bis die sumd.

Temp. 5 P.M. 40·2°C. Pulse 52. Resp. 28.

11th.—The animal is dull, the skin hot, accompanied by the usual symptoms of fever. Temp. A.M. 40·7°C. Pulse 64. Resp. 28. The hæmatozoa are swarming in the blood. Temp. 1 P.M. 40·4°C. Urine, none collected. Temp. 5 P.M. 40·3°C. Pulse 64. Resp. 28. The medicine was administered twice during the twenty-four hours.

12th.—The animal looks brighter this morning, the large petechiæ are three days old; the pulse is hard and quick. There is a slight nasal discharge of clear fluid. The hind limbs are slightly swollen, appetite good, fæces normal. Temp. A.M. 40°C. Pulse 48. Resp. 28. The hæmatozoa are few in the blood. Temp. 1 P.M. 40·1°C. Urine, none collected. Temp. 5 P.M. 38·6°C. Pulse 48. Resp. 36. One dose of the fever draught was given in the morning and in the evening the following :—

R. Cinchona Alkaloids ʒiij.
Liq. Arsenicalis ℥i.
Aquam ad Oj.

13th.—The animal continues bright and is better and the pulse has improved in character this morning; the petechiæ on the conjunctival membranes are fading, but the sheath and extremities still remain somewhat swollen. Temp. A.M. 38·1°C. Pulse 48. Resp. 20. There are a few hæmatozoa in the blood. Temp. 1 P.M. 39·1°C. Urine, turbid, lemon-coloured. Sp. Gr. 1,006, alkaline, contains no albumen, but phosphates, and polyhedral colourless crystals of Carbonate of Lime, with some striated spheres. Temp. 5 P.M. 38·5°C. Pulse 44. Resp. 24. The animal had two doses of medicine administered during the twenty-four hours.

14th. The condition of the animal is unchanged. Temp. A.M. 38·3°C. Pulse 52. Resp. 20. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·6°C. Urine, none collected. Temp. 5 P.M. 38·4°C. Pulse 52. Resp. 20. Two doses of the following medicine were administered during the twenty-four hours.

R. Cinchona Alkaloids ʒiij.
Liq. Arsenicalis ʒx.

15th.—The animal appears in the same condition as yesterday. Temp. A.M. 38·4°C. Pulse 52. Resp. 28. The hæmatozoa are few in the blood. Temp. 1 P.M. 39·3°C. Urine, clear, lemon-coloured. Sp. Gr. 1,003, alkaline, no albumen, no phosphates, but crystals of Carbonate of Lime. Temp. 5 P.M. 38·7°C. Pulse 48. Resp. 28. Two doses of the medicine were administered during the twenty-four hours.

16th.—The animal appears in the same condition, with this exception that the sheath is slightly swollen, and there is a patch of exudation in the subcutaneous tissue of the abdominal wall just anterior to the sheath. Temp. A.M. 39·1°C. Pulse 52. Resp. 12. The hæmatozoa are numerous in the blood. Temp. 1 P.M. 40·2°C. Urine, turbid, dirty greenish-orange in colour. Sp. Gr. 1,039, alkaline, no albumen, striated spheres of Carbonate of Calcium and a few Oxalates. Temp. 5 P.M. 40·3°C. Pulse 60. Resp. 44. Two doses of medicine were given during the day, the first contained Alkaloids ʒiij, Arsenic gr. v, and the second Alkaloids ʒiij, Arsenic gr. vi.

17th.—This morning the sheath is still swollen slightly and there is one petechia on the right conjunctival membrane, otherwise the condition of the animal is unchanged. Temp. A.M. 40°C. Pulse 56. Resp. 16. There are a few hæmatozoa in the blood. Urine, viscid, turbid, orange in colour. Sp. Gr. 1,030. Alkaline, there is a trace of albumen.

It was decided to try the effect of large doses of Quinine, and for this purpose ℥ss was administered at noon; previous to the dose being given, the pulse was 56. Resp. 32. Half an hour later the animal showed no symptoms and was quietly feeding. Temp. 1. P.M. 40·4°C. Pulse 60. Resp. 40. The animal appeared to be suffering from head-ache. At 2-10 P.M. the respirations had fallen to 32 per minute and the pulse to 22. At 4 P.M. the animal appears dull and the breathing is somewhat peculiar; it first takes eight or nine shallow respirations and these are followed by a deep sonorous one; pulse 48. Resp. 45. At 4-20 P.M. Temp. 39·8°C. Pulse 50. Resp. 24. At 6 P.M. 39·3°C. Pulse 50. Resp. 24. The animal appears quite easy and is feeding well. Twelve grains of Arsenic were given during the twenty-four hours, in water.

18th.—The animal appears bright and healthy, the petechia on the right conjunctival membrane is very faint in colour, and is disappearing fast. Temp. A.M. 39·3°C. Pulse 48, Resp. 30. The hæmatozoon is absent from the blood. Temp. 1 P.M. 39·8°C. Urine, turbid, lemon-coloured. Sp. Gr. 1,010. Alkaline, no albumen, no casts, Carbonates and Oxalates of Calcium. Temp. 5 P.M. 39°C. Pulse 44. Resp. 24. One dose of Quinine ʒv was administered at noon, and two doses of the Liquor Arsenicalis in water during the twenty-four hours.

19th.—The condition of the animal remains the same. Temp. A.M. 38·6°C. Pulse 48. Resp. 24. Administered Quinine ʒvi at 9 A.M. The hæmatozoa are few in the blood, but only one hæmatozoon was found in two specimens of blood. Temp. 1 P.M. 39·6°C. Urine, turbid, lemon-coloured. Sp. Gr. 1,004. Alkaline, albumen absent, crystals of Carbonate and Oxalate of Calcium. Temp. 5 P.M. 39·4°C. Pulse 48. Resp. 28. Two doses of Liq. Arsenicalis were given in water.

20th.—The animal appears bright, but notwithstanding this, œdema has appeared along the under-surface of the abdomen, and the sheath is swollen. Temp. A.M. 39·6°C. Pulse 56. Resp. 32. There are a few hæmatozoa in the blood. Temp. 1 P.M. 40°C. Urine, turbid, viscid, greenish yellow in colour. Sp. Gr. 1,034. Alkaline, no albumen, crystals of Carbonate , but no Oxalate of Calcium. Temp. 5 P.M. 39·6°C. Pulse 46. Resp. 28. Six drachms of Quinine and gr. xii of Arsenic were given during the twenty-four hours in one dose.

21st.—The animal appears in the same condition as yesterday, but there are several bright-red petechiæ on the conjunctival membranes. The œdema on the under-surface of the abdomen has not extended. The appetite is good, and the fæces quite normal in character. Temp. A.M. 39·4°C. Pulse 64. Resp. 20. There are a few hæmatozoa in the blood. Temp. 1 P.M. 40·1°C. Urine, turbid, viscid, yellow in colour. Sp. Gr. 1,028. Alkaline, no albumen, no phosphates. Temp. 5 P.M. 39·6°C. Pulse 60. Resp. 32. Six drachms of Quinine and gr. xii Arsenic were given in water during the twenty-four hours.

22nd.—This morning the animal looks perfectly healthy, with the exception of the slight œdema on the lower portion of the abdomen, in front of the sheath. The petechiæ have entirely disappeared from the conjunctivæ, and the visible mucous membranes are pale but clear. Temp. A.M. 39·4°C. Pulse 56. Resp. 24. There are still a few hæmatozoa in the blood. Temp. 1 P.M. 40°C. Urine, turbid, viscid, orange in colour. Sp. Gr. 1,020. Alkaline, albumen absent, crystals of Carbonate and Oxalate of Calcium. Temp. 5 P.M. 39·8°C. Pulse 52. Resp. 32. The animal received Quinine six drachms and Arsenic gr. xii during the twenty-four hours.

23rd.—The animal appears dull and is slowly losing condition. The pulse is weak and thready; the œdema is present but has not increased in amount; the membranes remain clear, but there are two small petechiæ on the right conjunctival membrane, the appetite remains good and the fæces normal in character. Temp. A.M. 39·2°C. Pulse 52. Resp. 28. The hæmatozoa are few in the blood. Temp 1 P.M. 39·8°C. Urine, turbid, viscid, creamy yellow in colour. Sp. Gr. 1,046. Alkaline, no albumen, but crystals of Carbonate and Oxalate of Calcium. Temp. 5 P.M. 39·2°C. Pulse 60. Resp. 24. Two doses of Cinchona Alkaloids ʒiii and Liq. Arsenicalis ℥iss were administered during the twenty-four hours.

24th.—The condition of the animal is unchanged; if anything, the œdema along the belly has slightly increased in amount. The visible mucous membranes are clear and there are no petechiæ on the conjunctivæ. Temp. A.M. 39°C. Pulse 48. Resp. 24. The hæmatozoon is absent from the blood. Temp. 1. P.M. 39·4°C. Urine, turbid, yellow in colour. Sp. Gr. 1,026. Alkaline, no albumen. Temp. 5 P.M. 39·5°C. Pulse 56. Resp. 32. Two doses of medicine were administered during the twenty-four hours, the Arsenic being increased to gr. viii in the evening.

25th.—The animal is exceedingly dull and semi-somnolent. The œdema has increased on the under-surface of the abdomen, but the condition of the sheath remains unaltered. Temp. A.M. 39·2°C. Pulse 52. Resp. 24. The hæmatozoon is absent from the blood. Temp. 1 P.M. 39·4°C. Urine, turbid, orange in colour. Sp. Gr. 1,026. Alkaline, contains no albumen, crystals of Carbonate and Oxalate of Calcium. Temp. 5 P.M. 39°C. Pulse 48. Resp. 24. The animal received two doses of medicine during the twenty-four hours.

26th.—The animal is much brighter and better in every way this morning. The œdema on the belly has been almost absorbed and that of the sheath is considerably less in amount. There are however several small petechiæ of a light red colour on the conjunctival membranes. The appetite is good, and the fæces normal in character. Temp. A.M. 39·2°C. Pulse 56. Resp. 24. The hæmatozoon is absent from the blood. Temp. 1 P.M. 39°C. Urine—Turbid, viscid, greenish-yellow in colour. Sp. Gr. 1,038, alkaline, no albumen, but contains crystals of Carbonate and Oxalate of Calcium. Temp. 5 P.M. 39°C. Pulse 56. Resp. 24. Two doses of medicine were administered during the twenty-four hours.

27th.—The general condition of the animal is unchanged. Temp. A.M. 39·2°C. Pulse 44. Resp. 24. The hæmatozoon is absent from the blood. Temp. 1 P.M. 39·3°C. Urine, turbid, viscid, greenish-yellow in colour. Sp. Gr. 1,034, alkaline, contains a trace of albumen; crystals of Carbonate and Oxalate of Calcium.

Two doses of the medicine were administered during the twenty-four hours. Temp. 5 P.M. 39·2°C. Pulse 52. Resp. 20.

28th.—The œdema of the under-surface of the belly has decreased in amount, but the sheath remains swollen and œdematous. There are five small wheals or raised patches of Urticaria on the left side of the neck, the longest being ¾″ × ¼″. The mucous membranes are clean; the right conjunctival membrane presents one ecchymosed spot on it. The animal has not lost in condition during the last few days. Temp. A.M. 39·2°C. Pulse 48. Resp. 24. The hæmatozoon is absent from the blood. Temp. 1 P.M. 39·1°C. Urine is turbid and slightly viscid, greenish-yellow in colour; Sp. Gr. 1,020, alkaline, contains no albumen; crystals of Carbonate and Oxalate of Calcium.

Two doses of medicine were administered during the twenty-four hours. Temp. 5 P.M. 39·2°C. Pulse 48. Resp. 24.

29th.—The general condition of the animal is unchanged. The five small patches of Urticaria are still present. Temp. A.M. 39°C. Pulse 52. Resp. 32. The hæmatozoon is absent from the blood. Temp. 1 P.M. 39·1°C. Urine, turbid, viscid, greenish-yellow. Sp. Gr. 1,022, alkaline, a trace of albumen; crystals of Carbonate and Oxalate of Calcium.

Two doses of medicine were administered during the twenty-four hours. Temp. 5 P.M. 38·8°C. Pulse 48. Resp. 28.

30th.—The animal is very dull this morning, the visible mucous membranes are somewhat injected, and the conjunctivæ present some three or four fresh petechiæ bright-red in colour. The Urticarial eruption which had persisted until last night, has now disappeared. The œdema of the limbs and sheath is reduced a little in amount; the appetite remains very good and the fæces are normal in character. Temp. A.M. 38·7°C. Pulse 48. Resp. 28. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·7°C. Urine, turbid, viscid greenish-yellow in colour, Sp. Gr. 1,020, alkaline, a trace of albumen. Temp. 5 P.M. 38·2°C. Pulse 44. Resp. 24. One dose of medicine containing Cinchona Alkaloids ʒiij, Arsenic gr. viij, was given this morning, but from the evening the dose of Arsenic was reduced to gr. v.

31st.—The animal appears much brighter this morning; the injection of the mucous membranes of the eye, and the œdema remain as yesterday. Temp. A.M. 37·7°C. Pulse 44. Resp. 36. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·2°C. Urine, turbid, viscid, greenish-yellow in colour. Sp. Gr. 1,024, alkaline, contains no albumen, but Carbonate and Oxalate of Calcium crystals. Temp. 5 P.M. 38·1°C. Pulse 44. Resp. 32. Two doses of medicine were administered during the twenty-four hours.

1st November.—The animal appears bright and healthy with this exception, that the progressive loss of flesh is becoming noticeable, otherwise the œdema has been absorbed from the under surface of the abdomen and from the extremities. The appetite is good and the evacuations normal in character. Temp. A.M. 38°C. P. 40. R. 28. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·3°C. Urine, turbid, viscid, of a yellowish-green colour. Sp. Gr. 1,024, alkaline, albumen 1/30th. Two doses of medicine consisting of Alkaloids ʒij. and Arsenic gr. iv were administered during the twenty-four hours. Temp. 5 P.M. 38°C. P. 40. R. 24.

2nd.—This morning the animal appears bright and healthy; all the swelling and œdema on the under-surface of the abdomen has disappeared and the pulse is strong and regular. The petechiæ on the conjunctival membranes are fading and the visible mucous membranes are clean. Temp. A.M. 37·8°C. P. 40. R. 24.

The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·2°C. Urine, turbid, viscid, yellowish-green; Sp. Gr. 1,032, alkaline, contains a trace of albumen and blood casts, crystals of Carbonate but no Oxalates. Temp. 5 P.M. 38·3°C. P. 44. R. 28. Two doses of the medicine were administered during the twenty-four hours.

3rd.—The general condition of the animal has improved since yesterday. Temp. A.M. 37·5°C. P. 36. R. 20. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38°C. Urine, turbid, viscid, yellowish-green in colour. Sp. Gr. 1,038, alkaline, contains albumen;

blood and epithelial casts, Carbonate and Oxalate of Calcium crystals. Temp. 5 P.M. 38·1°C. P. 48. R. 28. Two doses of medicine were administered during the twenty-four hours.

4*th.*—The condition of the animal improves daily, the visible mucous membranes are clean and there are no petechiæ on the conjunctivæ. Temp. A.M. 38·°C. P. 44. R. 28. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·3°C. Urine, turbid, viscid, creamy-yellow, later becoming greenish in colour, a few red blood corpuscles and epithelial casts. Sp. Gr. 1,042, alkaline, crystals of Carbonate and a few Oxalates. Temp. 5 P.M. 37·8°C. P. 44. R. 28. Two doses of the medicine were administered during the twenty-four hours.

5*th.*—This morning the animal appears to be in perfect health, and it would be impossible for any one to diagnose that it is a subject of Surra; the visible mucous membranes are clean, the conjunctivæ free from petechiæ, there is no discharge from the nose and the swelling and œdema on the under-surface of the belly has quite disappeared. Temp. A.M. 37·7°C. P. 46. R. 28. The hæmatozoon is absent from the blood. The red blood corpuscles form healthy rouleaux, the white are normal in character and in number. Temp. 1 P.M. 38·1°C. Urine, turbid, viscid, yellowish-green in colour. Sp. Gr. 1,028. Alkaline, there is the slightest trace of albumen, no blood, a few epithelial casts, only one small one being found in two specimens of urine. Temp. 5 P.M. 38°C. P. 40. R. 28. Two doses of medicine were administered during the twenty-four hours.

6*th.*—The condition of the animal is unchanged. Temp. A.M. 38·2°C. P. 36. R. 28. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38.2°C. Urine, turbid, viscid, greenish-brown in colour. Sp. Gr. 1,030. Alkaline, contains no albumen; there are no casts, but numerous crystals of Carbonate and Oxalate of Calcium. Temp. 5 P.M. 38·2°C P. 36. R. 28. Two doses of medicine were given during the twenty-four hours.

7*th.*—The general condition of the animal is unchanged, although it appears somewhat dull; the visible mucous membranes are clean and there are no petechiæ on the conjunctivæ. Temp. A.M. 38·4°C. P. 40. R. 24. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·7°C. Urine, turbid, viscid, yellow in colour. Sp. Gr. 1,026. Alkaline, contains just a trace of albumen, no casts, but numerous crystals of Carbonates and Oxalates. Temp. 5 P.M. 38·3°C. P. 44. R. 32. Two doses of the medicine were administered during the twenty-four hours.

8*th.*—This morning the animal looks bright and healthy; the abdominal swelling and that of the sheath remain absent; there is however the slightest trace left round the fetlocks. The visible mucous membranes are clean, but there are two petechiæ present on the membrana nictitans of the right eye. The pulse is full and regular. The fæces appear normal in character, but emit a bad odour. Temp. A.M. 38°C. P. 36. R. 28. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·7°C. Urine, turbid, viscid, yellowish-brown in colour. Sp. Gr. 1,042, alkaline and contains albumen $\frac{1}{22}$nd, granular casts and Oxalate of Calcium crystals, but no Carbonates. Temp. 5 P.M. 39·2°C. P. 36. R. 32. Two doses of the medicine were administered during the twenty-four hours.

9*th.*—The animal looks dull and the petechiæ on the right membrana nictitans still persist, otherwise there is nothing noticeable. Temp. A.M. 38·8°C. P. 36. R. 16. The hæmatozoon is absent from the blood. Temp. 1 P. M. 39·4°C. Urine, turbid, viscid, yellowish green in colour; Sp. Gr. 1,046, alkaline, contains albumen a trace, with crystals of Nitrate. Two doses of the medicine were administered during the twenty-four hours, the latter being increased to Alkaloids ʒ iij, Arsenic gr. vi. Temp. 5 P.M. 40·3°C. P. 44. R. 32.

10*th.*—The condition of the animal is unchanged. The temperature however fell during the night and there is a slight watery discharge from the right nostril. Temp. A.M. 39·3°C. P. 40. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 39·2°C. Urine, turbid, viscid, yellow in colour. Sp. Gr. 1,040, alkaline, contains albumen $\frac{1}{45}$th, a few casts and enormous quantities of Carbonate of Calcium, but no Oxalates. Two doses of the medicine were administered during the twenty-four hours. Temp. 5 P.M. 39·4°C. P. 36. R. 12.

11*th.*—There appears to be no change in the general condition of the animal; the discharge from the right nostril is less in amount. Temp. A.M. 39·2°C. P. 36. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 39·3°C. Urine, turbid, viscid, brownish-yellow in colour; Sp. Gr. 1,035, alkaline and contains a faint trace of albumen, together with a few red blood corpuscles and granular casts, very numerous crystals of Carbonate and Oxalate of Calcium. Two doses of the medicine were administered during the twenty-four hours. Temp. 5 P.M. 39·6°C. P. 44. R. 16.

12*th.*—The animal appears brighter to-day and the discharge from the nostril is still less in amount. There are a few ecchymoses of a bright-red colour on the conjunctival membranes, otherwise the animal appears in normal health. Temp. A.M. 39·3°C. P. 32. R. 12. The hæmatozoon is absent from the blood, which latter, on examination, is indistinguishable from that seen in the healthy state. Temp. 1 P.M. 39°C. Urine, none was collected. The medicine was not administered this evening. Temp. 5 P.M. 39°C. P. 40. R. 12.

13*th.*—The animal appears somewhat dull this morning; there is very slight discharge from the nostrils, the visible mucous membranes are clean, but the petechiæ show no signs of fading; the appetite is good and the fæces normal. Temp. A.M. 39°C. P. 32. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·2°C. Urine, turbid, viscid, orange. Sp. Gr. 1,028, alkaline, albumen, a slight trace, crystals of Carbonate and Oxalate of

Calcium. One dose of the medicine consisting of Alkaloids ʒij, Liq. Arsenicalis ʒi was admnistered in the evening. Temp. 5 P.M. 38·7°C. P. 32. R. 16.

14th.—The animal this morning appears to be extremely dull and stupid, presenting much the same appearance as an animal stupefied with a narcotic. The head is hanging, eyes dull and heavy, the attitude indicative of great depression. The head is swollen, especially about the lips and the lower part of the nose, also to a less extent in the sub-maxillary region and over the parotids. The surface temperature of the body is sub-normal, the ears especially being very cold; the giddiness, headache, staggering gait and muscular weakness, together with an exceedingly feeble circulation must be the effect of Cinchonism. The membranes are slightly tinged yellow and there are a few petechiæ on the conjunctivæ. Temp. A.M. 37°C—a little below normal. Pulse 28, very weak. Respirations 10. There is a great disinclination to move and altogether the animal presents symptoms of extreme prostration. The following draught was administered at 11 o'clock A.M. :—

R. Spt. Ammon. Ar. ℥ii.
Spt. Chloroformi, ℥ss.
Aquam ad ℥xx.

At the same time the animal was taken into the sun and the surface of the body rubbed and its clothing put on. Temp. 1 P.M. 37°C. The hæmatozoon is absent from the blood. Urine, clear, lemon-coloured. Sp. Gr. 1,010, alkaline, contains a slight trace of albumen, together with crystals of Carbonate and Oxalate of Calcium.

The above draught was repeated at six o'clock P.M. During the afternoon the animal took several pounds of lucerne grass and in the evening consumed his feed of corn and bran. Temp. 5 P.M. 37·7°C. P. 36. R. 12.

15th.—During the night the animal remained in the upright position and this morning presents the same dull and semi-somnolent appearance which it did yesterday. The pulse is a little stronger but is reduced in frequency, and the respirations in number. The appetite has fallen off and the animal has only eaten a small quantity of corn and a little grass. Temp. A.M. 37·1°C. P. 24. R. 8. The hæmatozoon is still absent from the blood. Temp. 1 P.M. 37·2°C. Urine, turbid, pale yellow in colour, Sp. Gr. 1,014, alkaline, and contains the faintest trace of albumen, crystals of Carbonate and Oxalate of Calcium. The animal received twice during the twenty-four hours, a draught containing Spt. Ammon. Ar. ℥ij and Spt. Chloroformi ℥iss. Aquam ad Oj. Temp. 5 P.M. 38·3°C. P. 36. R. 16.

16th.—The animal lay down during the night, and this morning assumed the upright position without assistance. It stands, however, for long periods in one position in a semi-somnolent condition, the head hanging down, within a foot and a half of the ground, the eyes closed and every now and then has to balance itself in order to keep from falling over. When roused, it lifts up its head and becomes more or less bright for a time, eating a certain amount of lucerne grass but after ten minutes relapses into the same dull condition as previously noted. There is no tenderness on pressure over the spinal column in its whole length or over the region of the kidneys; the urine is passed freely and in quantity. The pulse is very weak and thready and the respirations tranquil. The fæces appear normal in character and quantity. Temp. A.M. 37·5°C. P. 28. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37°C. Urine, turbid, orange; Sp. Gr. 1,020, alkaline, albumen absent, crystals as before. During the day two doses of Ammonia and Spt. Chloroformi have been administered in addition to Quinæ Sulph. ʒiss at 6 P.M. As the appetite was poor, four seers of milk were given between 4 P.M. and 8 P.M. Temp. 5 P.M. 37·8°C. P. 32. R. 12.

17th.—The animal lay down during the night and the effect of the Cinchona Alkaloids is passing off, notwithstanding the fact that two doses of Quinæ Sulph. one drachm and a half on each occasion were given last night and the first thing this morning. The animal looks brighter and is more lively; it holds its head up, the swelling and œdema about the nose and face have decreased considerably in amount, the skin is warmer and the pulse has become fuller and stronger. The animal however devotes a considerable part of its time to looking round at the left scapular region grinding its teeth occasionally; nothing however is to be made out on auscultation. The appetite is poor. Temp. A.M. 37°C. P. 28. R. 16. There are no hæmatozoa in the blood. Temp. 1 P.M. 36·7°C. Urine.—None was passed during the day. There is little doubt now that the animal is suffering from gastric irritation; it keeps its head continually round to the left side with its nose touching the region of the stomach or thereabouts. After eating a small quantity of grass a paroxysm of pain is brought on and is soon followed by grinding of the teeth; the animal then walks round in a circle, the left fore-limb acting as a pivot. The following draught was administered at 6 P.M :—

R. Bismuthi : Subnitras ʒi.
Extract : Opii ʒi.
Sodii : Bicarb ʒij.
Mucilag : Acaciæ ad ℥xx.

This draught appeared to bring some relief, for the animal remained quiet for some hours. Temp. 5 P.M. 38·8°C. P. 44. R. 28. Milk mixed with water was given at intervals to the animal.

18th.—This morning the animal is in a dull and semi-somnolent condition; the draught was repeated at six o'clock, when the Temp. was 38°C. P. 40. R. 16; but as the symptoms were again becoming pronounced, a second dose was administered at 1-30 P.M., when the temperature was found to be 39°C. The animal has eaten nothing, but milk and water has been given to it at intervals. The hæmatozoon is still absent from the blood. No urine has been passed up to 4 o'clock P.M. The medicine was again repeated with Spt. Ætheris. Nitrosi. ℥ii in addition. Temp. 5 P.M. 39·6°C. P. 48. R. 12. In all eight seers of milk have been given to the animal during the day, but no grass or corn.

19th.—The animal stands in one position for hours, but has ceased to look round at the left side; it certainly is improved, and when lucerne grass is placed in its mouth readily eats it. The pulse is stronger, more feequent, but regular; the respirations have again fallen in point of number per minute. Up to mid-day, four seers of milk mixed with water have been administered. Temp. A.M. 39°C. P. 64. R. 12. The hæmatozoon which has been absent for twenty-seven days has now been re-discovered, but only one was observed in two coverglass specimens of blood. The return of the organism is due to the fact that the condition of the animal rendered it absolutely necessary to abstain from giving the Cinchona Alkaloids and Arsenic after the morning of the 14th instant, although at that time it was only taking the ordinary medicinal doses of Arsenic gr. iv and two drachms of the Alkaloids. Temp. 1 P.M. 39·6°C. No urine was again passed during the day. Milk and water was given at intervals up to eight o'clock this evening. Two doses of the medicine have been administered during the last twelve hours. Temp. 5 P.M. 40·6°C. P. 64. R. 36.

20th.—The animal remained standing during the night, and this morning there is no improvement in its condition, although it continues to take a fair amount of milk. The pulse is strong and frequent but regular. The respirations which had become materially increased last night have now dropped again to normal. Temp. A.M. 39·3°C. P. 76. R. 20. The hæmatozoa are numerous in the blood. The red corpuscles are pale in colour and have run together into masses, but the individual corpuscles can be distinctly made out. The white are more numerous than in the healthy state, otherwise they are unaltered. No urine was passed. During the day four seers of milk have been administered, mixed with water, at intervals of two hours. Subcutaneous injections of Morphiæ (gr.iss) were given at 11 A.M. and 6 P.M. The animal fell and was unable to assume the upright position after nine o'clock P.M. Death took place at 3 A.M. on the 21st November.

AUTOPSY.—8 A.M. 21st November 1892. The body is somewhat emaciated, but there is a total absence of œdema from the extremities and the under-surface of the abdomen.

Thorax.—There is no fluid in the pleural cavities and there are no pleuritic adhesions.

Lungs.—There is localized emphysema at the apices and along the free edges. The surfaces of the organs are thickly dotted over with ecchymoses lying under the pleuræ and are for the most part circular in contour, varying in size from 1 to ⅛th of an inch in diameter.

On Section.—The tissues present a peculiar marbled appearance, one portion being pink and the other white in colour, but macroscopically no pathological change can be detected in either portion.

Heart.—The pericardial sac contains three ounces of blood-stained fluid, in which the hæmatozoon could not be detected microscopically. The external surface of the organ presents a pale appearance, the muscular tissue looking flabby and fatty. The base is surrounded with a light orange coloured exudation, gelatinous in character and occupying the position usually held by the fat. There are some large extravasations of blood lying beneath the visceral pericardium, more especially along the course of the coronary vessels and extending for half an inch on either side of them.

The cavities of the *right auricle* and *ventricle* are stained a claret colour. There are, however, no sub-endocardial extravasations present. The valves present a healthy appearance. The *left auricle* presents nothing abnormal. The walls of the *left ventricle* are somewhat contracted and pale in appearance. There are several groups of extravasations dotted over the walls—one patch just below the aortic exit; but those best marked are found lying on the musculi-papillares. *On section* these latter are found to invade the tissues to a depth of half an inch.

Abdominal cavity.—The peritoneal sac is free from fluid.

Liver.—Enlarged, weighs 13 lbs. 12 ounces; healthy in appearance externally as also on section.

Spleen.—Weighs 3 lbs. 1 ounce; is enlarged to half as much again as normal. There are a few sub-capsular petechiæ, especially on the convex surface of the organ. The tissue on section is found to present a dark colour and a semi-solid consistency.

Kidneys.—The capsules strip easily and are found to be dotted over with small, circular extravasations, dark in colour, lying beneath the capsules, and which on section are seen to invade the cortical portion to the extent of 1/12th of an inch. The right weighs 1 lb. 11 ozs., the left 1 lb. 9 ozs.

Stomach.—The organ is somewhat contracted. *On Section* it is found to be nearly empty. The *cuticular* portion is healthy in appearance, with the exception of a narrow band two inches in width, the seat of a yellow coloured deposit, situated close to the line of demarcation. The mucous membrane of the *villous* portion also is healthy in structure, with this exception that there are four tumours, the size of walnuts, each being surmounted by a hole one-sixth inch in diameter, leading into it, these being placed on the cuticular border of the line of demarcation, whilst the fourth lies about three inches from it at the *fundus,* along the greater curvature.

Small intestines.—About midway between the pyloric end of the stomach and the ileo-cæcal valve, the mucous membrane for a distance of three feet is dotted over with small superficial patches of congestion, varying in size from one-eighth to one-fourth of an inch in diameter. There is however no loss of epithelium on the surface of these patches and no sign of ulceration throughout the whole length of the small intestine. Peyer's patches and the solitary glands present a normal appearance.

Large intestine.—There is a quantity of semi-fluid fæces in the *cæcum* and upper part of the *colon,* which was found to contain a number of small nematodes—a few examples of the *strongylus armatus* six in number, were discovered attached to the mucous coat, which latter does not present any particular changes, except a few patches of slight congestion.

Bladder.—Contains several litres of a viscid fluid, of the consistency of white of egg, Sp. Gr. 1,030, alkaline. The inner surface of the organ is free from extravasations of blood, except at the *fundus* and here a patch, two inches square, made up of small hæmorrhages, dark in colour, is situated.

Brain.—The brain and cerebral membranes present a healthy appearance. There is however about half an ounce of fluid in the lateral ventricles.

Remarks.—This animal, aged 5 years, was recognized to be suffering from 'Surra' on the morning of the 7th October 1892, when the hæmatozoon was discovered on microscopical examination of its blood.

On admission to the Laboratory Hospital on the 9th October at 8 A.M. the animal was found to be in apparently perfect health and in splendid condition. On this day the hæmatozoon was absent from the blood, and it was observed that it would have been an absolute impossibility for any one to diagnose the case as one of 'Surra' in the absence of the organism, or even to recognize that the animal was ill, much less that it was the subject of an incurable disease, which must in the course of a few months prove fatal. For the next two days the hæmatozoa were swarming in the blood; specific treatment was deferred and a simple febrifuge draught was given to try and reduce the fever. On the 12th however the organisms were few in the blood. Recognizing therefore that this case offered advantages which might not again be forth-coming, it was decided to again attempt the destruction of the hæmatozoon by the exhibition of Cinchona Alkaloids and Arsenic, commencing in this instance with large doses, *viz.,* Alkaloids three drachms and Arsenic four grains. The reason why large doses of the former were exhibited, was that few hæmatozoa remained in the blood, and in order to decide whether their destruction could be compassed by the drug, the dose was so regulated as to insure its having a fair trial. On the morning of the 13th, after two doses of the medicine had been given, the animal presented a bright appearance, the temperature was 38·1°C. and the symptoms were ameliorated somewhat. The urine was found to have a Specific Gravity of 1,006, alkaline, but was free from albumen, phosphates were present in a small amount and crystals of Carbonate and Oxalate of Lime. From this date until the evening of the 15th, the temperature varied between 38·1°C and 39·3°C, the hæmatozoa were few in the blood and the pulse did not exceed 52. On the morning of the 16th the temperature rose and in the evening registered 40·3°C. The hæmatozoa were numerous, respirations were increased in number and the œdematous exudation had extended; the treatment was continued, the dose of Arsenic having been gradually increased to six grains. On the 17th the organisms had again fallen to few, but the temperature and pulse were still above normal, and a trace of albumen was found in the urine. It was decided to try the effect of full doses of Quinine, as this drug has been said to be of much value when exhibited with Arsenic, and Rankin states that he has been able to cure the disease. From noon on this date until the evening of the 22nd the animal received thirty-three drachms of Quinine and seventy-two grains of Arsenic. The fever was characterized by mid-day exacerbations and remissions in the evening, extending until the morning in most instances; the pulse varied between 42 and 64 beats per minute, but the respirations showed considerable differences in their range, especially after the first dose of Quinine; on the 17th morning observation being recorded as 12, whilst that of the evening was 51 per minute.

On the second day the organism was absent, but on the four subseqent days these were few in the blood. On the morning of the 23rd the animal presented a dull appearance, but not markedly so, and as the Quinine and Arsenic in large doses had apparently produced no amelioration of the animal's condition, nor the slightest effect upon the vitality of the hæmatozoon which was as active as before, it was resolved to abandon the Quinine and return to the use of Cinchona Alkaloids and Arsenic; consequently six drachms of the former and twelve grains of the latter were administered during the twenty-four hours. From the morning of the 24th October, the hæmatozoon was absent from the blood, until the 19th November, on which date it reappeared, but one organism only was discovered in two coverglass specimens of the blood. During this period of twenty-six days, the temperature gradually fell until it attained a maximum of 37·5°C. on the morning of the 3rd November and from that date it gradually rose, attaining a maximum of 40·3°C. on the evening of the 9th November, and again fell to 37°C. on the 14th November and from this date until 20th there were morning remissions and evening exacerbations, until on the latter date 41·5°C. was registered by the thermometer, the evening previous to death. The medicines were continued in varying doses so as to accommodate them to the condition presented by the animal until the evening of the 14th November with two exceptions, namely, on the evening of the 12th and morning of the 13th when they were omitted, during which period one hundred and seven drachms of Cinchona Alkaloids and two hundred and forty-one grains of Arsenic in the form of Liquor Arsenicalis were administered. At mid-day on the 14th November, serious symptoms were noticed, the animal appearing almost somnolent, head hanging, eyes dull and heavy, and the attitude indicative of extreme depression, and œdematous swellings present around the lips and lower parts of the nose. The surface of the body was cold, especially the extremities, the internal temperature and the pulse were sub-normal. Stimulants were administered, chiefly Ammonia, and friction carried out over the body and limbs with a view to exciting the circulation. This treatment was persevered with until the evening of the 16th, when owing to fresh crops of petechiæ having made their appearance on the conjunctivæ, it was deemed advisable to continue with a small dose of Quinine as less irritating than Cinchona Alkaloids; this dose was repeated on the following morning, November 17th, but in consequence of symptoms of gastric irritation having presented themselves Bismuthi and Opium were given and continued twice daily until the evening of the 19th. On the 20th, the treatment adopted was Morphia gr. iss by subcutaneous injection in the morning; repeated at 6 P.M. Death occurred at 3 A.M. on the 21st.

On the 11th day of the disease a trace of *albumen* was found in the urine, but nothing abnormal on microscopical examination of the sediment on standing. On the 20th day the colour of the secretion changed from an orange to a yellowish-green colour, and a trace of bile salts and acids was then detected, but no albumen was observed until the following day when a trace appeared; then missing a day it re-appeared, and on the 25th an appreciable amount, $\frac{1}{24}$th was recorded. On this day, for the first time, the microscope revealed, on examination of the sediment of the urine, the changes taking place in the kidneys; red blood corpuscles, epithelial and blood casts were found together with crystals of Carbonate and Oxalate of Calcium. This condition of things continued until the 31st day with the exception of the 29th day, when the albumen was absent. On the former date, granular took the place of the epithelial casts, and were present until the 35th day after which no more were observed. The albumen was again absent from the urine on this date, but on every subsequent examination until death, with the exception of the 40th, albumen was always present—however small in amount—and on the day of death $\frac{1}{15}$th was found.

RECORDS OF URINE.

Animal—Bay Australian. No. LXXII. Date, October 13th, 1892.

Disease—Naturally acquired Surra.

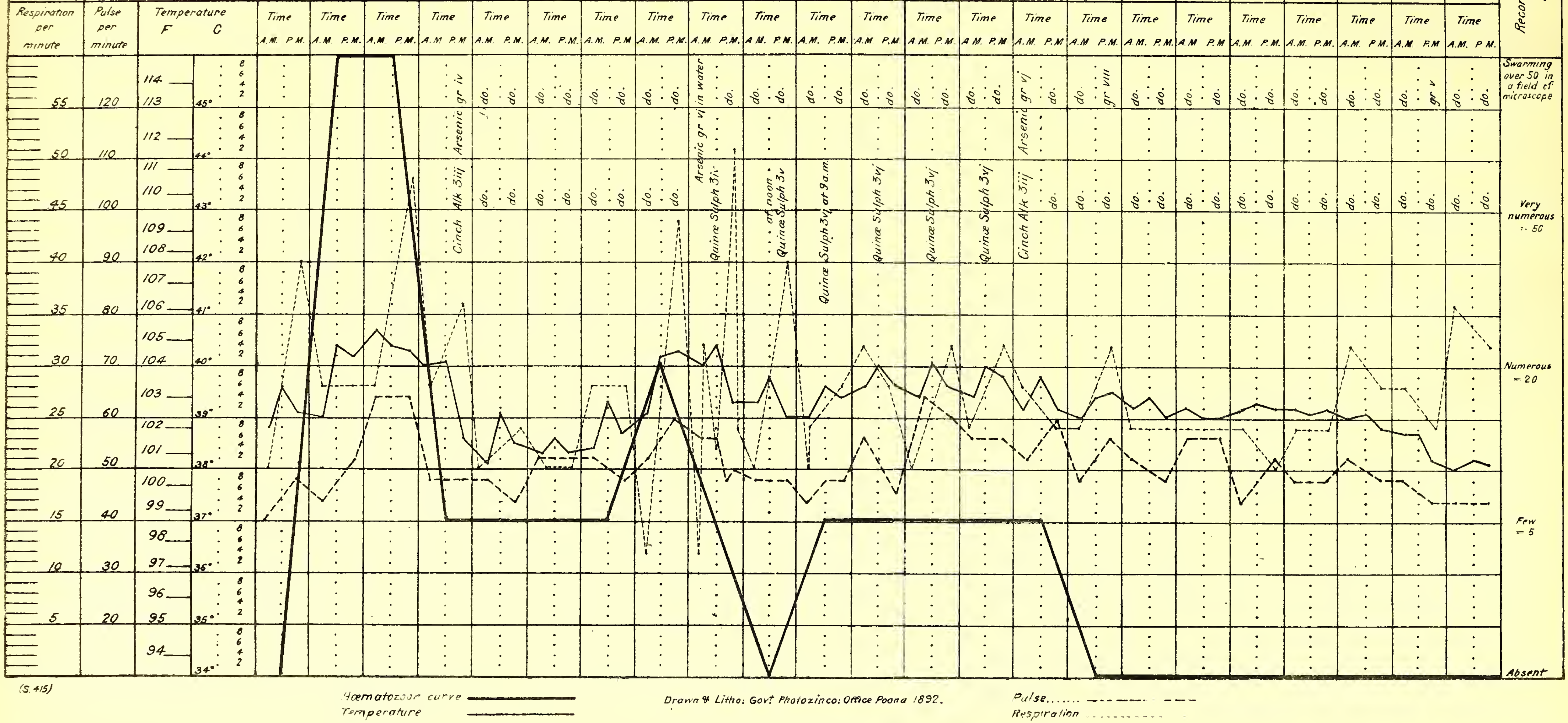
Date.	Quantity.	Colour.	Re-action.	Specific Gravity.	Albumen.	Phosphates.	Remarks.	
1892. October 13 ...	......	Clear lemon ...	Alkaline ...	1,006	Nil ...	Small amount.	Crystals of carbonate and oxalate of calcium.	
15 ...	......	Do. ...	Do. ...	1,008	Nil ...	Nil ...	„	„
16 ...	......	Turbid, viscid, greenish orange.	Do. ...	1,039	Nil ...	Nil ...	„	„
17 ...	......	Turbid, viscid, orange.	Do. ...	1,030	A trace.	Nil ...	„	„
18 ...	......	Turbid, viscid, lemon.	Do. ...	1,010	Nil ...	Nil ...	„	„
19 ...	......	Do. do. ...	Do. ..	1,004	Nil ...	Nil ...	„	„
20 ...	......	Turbid, viscid, greenish yellow.	Do. ...	1,034	Nil ...	Nil ...	„	„
21 ...	......	Turbid, viscid, yellow.	Do, ...	1,028	Nil ...	Nil ...	„	„
22 ...	......	Turbid, viscid, orange.	Do. ...	1,020	Nil ...	Nil ...	„	„
23 ...	......	Turbid, viscid, creamy yellow.	Do. ...	1,046	Nil ...	Nil ...	„	„
24 ...	.....	Turbid, viscid, yellow.	Do. ...	1,026	Nil ...	Nil ...	„	„
25 ...	......	Turbid, viscid, orange.	Do. ...	1,026	Nil ...	Nil ...	„	„
26 ...	... ..	Turbid, viscid, greenish yellow.	Do. ...	1,038	Nil ...	Nil ...	Crystals and slight trace of bile salt and acids.	
27 ...	......	Do. do. ...	Do. ...	1,034	A trace.	Nil ...	„	„
28 ...	......	Do. do. ...	Do. ...	1,020	Nil ...	Nil ...	„	„
29 ...	......	Do. do. ...	Do. ...	1,022	A trace.	Nil ...	„	„
30 ...	......	Turbid, viscid, yellowish green.	Do. ..	1,020	A trace.	Nil ...	„	„
31 ...	......	Do. do. ...	Do. ...	1,024	1/24th .	Nil ...	„	„

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Australian Gelding — Age — Sex, Gelding — Colour, Bay

Disease, "Surra" naturally contracted — Date of Attack, Oct. 7th 1892 — Result, Death — Date of Result, 21-11-92 — Register No. LXXII

Dates of Observation.	Oct. 9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Days of Disease	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Organisms in Blood.	—	S	S	F	F	F	F	N	F	—	F	F	F	F	F	—	—	—	—	—	—	—	—



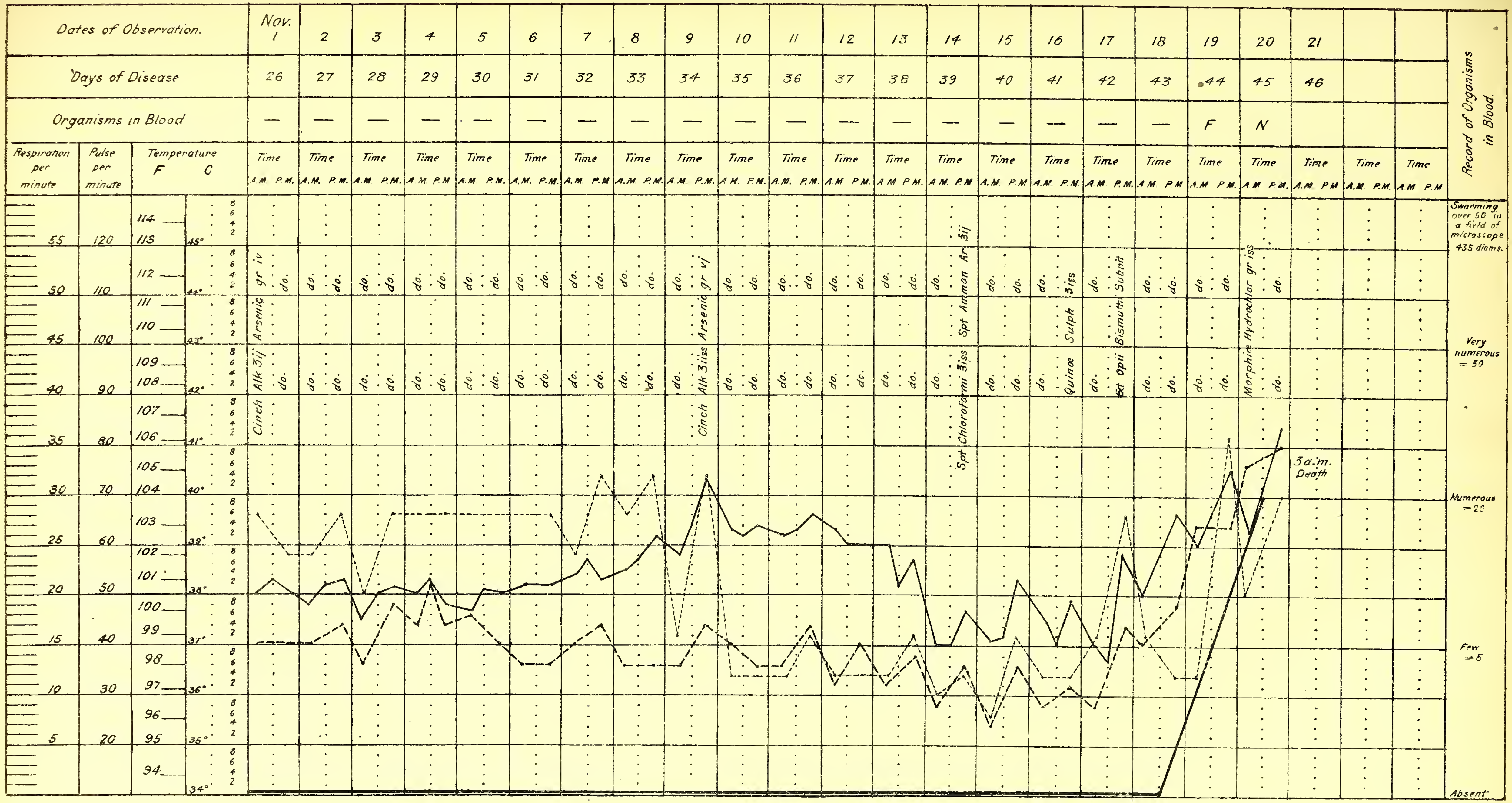
(S. 415)

Drawn & Litho: Govt. Photozinco: Office Poona 1892.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age ______ Sex ______ Colour ______

Disease ______ Date of Attack ______ Result ______ Date of Result ______ Register No. LXXII



(S. 415)

Hæmatozoon curve ————

Temperature ————

Drawn & Litho: Govt Photozinco: Office Poona 1892.

Pulse — — — —

Respiration - - - - -

Date.	Quantity.	Colour.	Reaction.	Specific Gravity.	Albumen.	Phosphates.	Remarks.
1882. November 1 ...	......	Turbid, viscid, yellowish green.	Alkaline ...	1,024	1/30th.	Nil ...	Epithelial and blood casts, red blood corpuscles and crystals slight trace of bile salts and bile acids.
2 ...	......	Do. do. ...	Do. ...	1,032	A trace.	Nil ...	Blood casts, trace of bile salts and bile acids, crystals of carbonate but no oxalate.
3 ...	......	Do. do. ...	Do. ...	1,038	A trace.	Nil ...	Epithelial and blood casts, carbonate and oxalate crystals.
4 ...	......	Turbid, viscid, orange yellow.	Do. ...	1,041	Nil ...	Nil ...	Epithelial casts, red corpuscles, carbonates and a few oxalates.
5 ...	......	Turbid, viscid ...	Do. ...	1,028	Slight trace.	Nil ...	A few small epithelial casts, no blood crystals.
6 ...	......	Do. ..	Do. ...	1,030	Nil ...	Nil ...	Granular casts.
7 ...	......	Turbid, viscid, yellow.	Do. ...	1,026	A trace.	Nil ...	Granular casts.
8 ...	......	Turbid, viscid, yellow brown.	Do. ...	1,042	1/22nd.	Nil ...	Granular casts oxalates but no carbonates.
9 ...	......	Turbid, viscid, yellowish green.	Do. ...	1,046	A trace.	Nil ...	Granular casts, oxalates and few carbonates and crystals of nitrate
10 ...	......	Turbid, viscid, bright yellow.	Do. ...	1,040	1/45th.	Nil ...	Few granular casts, large numbers of carbonate but no oxalates.
11 ...	......	Do. do. ...	Do. ...	1,035	A faint trace.	Nil ...	Granular casts, red blood corpuscles, casts and oxalates.
13 ...	......	Turbid, viscid, orange.	Do. ...	1,028	A slight trace.	Nil ...	No casts. crystals of carbonate and oxalate of calcium.
14 ...	......	Clear lemon ...	Do. ...	1,010	A slight trace.	Nil ...	No casts ,, ,,
15 ...	......	Turbid, pale yellow.	Do. ...	1,014	A faint trace.	Nil ...	No casts ,, ,,
16 ...	......	Turbid, viscid, orange.	Do. ...	1,020	Nil ...	Nil ...	No casts ,, ,,
21 ...	......	Turbid, viscid, white of egg.	Do. ...	1,030	1/15th.	Trace ...	No casts ,, ,,

CASE No. LXXIII.—BAY AUSTRALIAN.—*Previous History.*—This animal was purchased by the Bombay Tramway Company on the 17th April 1892, aged 7 years.

26th July 1892.—It was off its feed for one day. On 14th October 1892 fever developed and it was taken into the Infirmary where it remained three days. On the 17th, as the temperature was 37·2°C., it again was worked, doing 13 miles per diem, until 24th, when a general eruption of Urticaria broke out: on that date the temperature was 37·2°C. as also on the 25th, 26th and 27th. On the 28th the temperature in the evening registered 38·3°C. P. 48. 29th A.M. Temp. 38·8°C. P. 50. 30th A.M. Temp. 38·3°C. P. 48. Hæmatozoon discovered. Temp. P.M. 40·5°C. P. 84.

31st.—The animal arrived at the Laboratory Hospital at 7-45 A.M., the second day of the disease.

On admission.—The animal is in fair condition, but looks aged; there is no fever, but the conjunctival membranes present large claret-coloured extravasations, especially involving the membrana nictitans in both eyes. The general surface of the skin looks uneven, and puffed, and on the left side of the neck there are several patches which appear to be the remnants of an Urticarial eruption which has almost disappeared. There is slight œdema about the fetlocks which are neither hot nor painful to the touch. Temp. A.M. 38°C. The pulse is weak and thready—56 beats—and the respirations are 36 per minute. The hæmatozoon is absent from the blood; the red corpuscles form healthy rouleaux and the white are normal as regards number and size. Temp. 1 P.M. 37·7°C.

Urine.—Turbid, yellow, Sp. Gr. 1,018, alkaline, contains no albumen, crystals of Carbonate and Oxalate of Calcium. Temp. 5 P.M. 38·3°C. P. 44. R. 40.

One dose of the double Iodide of Mercury and Potass, gr. ii, was administered in the evening.

1st November.—The condition of the animal is unchanged except that there appears to be a slight increase in the amount of œdema of the hind limbs. Temp. A.M. 38°C. P. 44. R. 20.

The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·5°C. Urine, turbid, orange in colour, Sp. Gr. 1,034, acid in re-action and contains a trace of albumen.

Two doses of the medicine were administered during the twenty-four hours. Temp. 5 P.M. 38·2°C. P. 44. R. 20.

2nd.—This morning the animal is bright and moves freely about its loose box. There is a discharge of mucus from the right nostril. The eruption has not altogether disappeared from the skin, as a few patches of Urticaria are still visible on the left flank. The petechiæ are fading from the conjunctivæ. Temp. A.M. 38·1°C. P. 44. R. 16. There are a few hæmatozoa in the blood. Temp. 1 P.M. 38·4°C. Urine, turbid, viscid, orange, Sp. Gr. 1,032, acid, contains a slight trace of albumen, crystals of Carbonate and Oxalate of Calcium. Two doses of medicine were administered during the twenty-four hours, the latter containing grs. iv. Temp. 5 P.M. 39·8°C. P. 60. R. 24.

3rd.—This morning a general eruption of Urticaria appeared over the neck, chest, ribs and flanks, the largest wheals being observed over the ribs and under-surface of the abdomen. The eruption began to disappear at 10 o'clock and by noon only little was left—a few patches over the neck and scapular regions. Temp. A.M. 39·8°C. P. 64. R. 20.

There are a few hæmatozoa in the blood. Temp. 1 P.M. 40°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,040, alkaline, contains no albumen; crystals of Carbonate and Oxalate of Calcium. Two doses of the medicine were administered during the twenty-four hours, the last dose being increased to gr. v. Temp. 5 P.M. 39·5°C. P. 48. R. 28.

4th.—An eruption of Urticaria is again well marked this morning over the skin covering the neck, chest, scapular regions, ribs, hind quarters and extremities, and between the thighs; some of the individual patches of the rash are one inch in length by half an inch in width at their widest part, and oval in form. The visible mucous membranes are clean and healthy-looking, and petechiæ are entirely absent from the conjunctivæ. The pulse is regular and only slightly increased in frequency. The appetite is very good. Fæces normal in character. Temp. A.M. 39·1°C. P. 44. R. 28.

The hæmatozoa are numerous and active in the blood, and many are attached by their flagellated extremities in groups of two and three. The red corpuscles are massed together, but do not form healthy rouleaux. The white corpuscles are not increased in number. Temp. 1 P.M. 40·1°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,018, alkaline, contains no albumen. Two doses of medicine were administered during the twenty-four hours; the latter was, however, increased to grs. vii of the drug. Temp. 5 P.M. 40·5°C. P. 64. R. 28.

5th.—The animal looks fairly well but on examination the visible mucous membranes present a yellowish, unhealthy appearance, as also the conjunctivæ; the tongue is furred, the skin hot, the pulse full and hard and there is a general fulness of the veins of the body especially noticeable in the sub-maxillary when the pulse is being felt. The eruption has not altogether disappeared. One or two patches are still to be observed on the right side of the neck, but the other portions of the body are free from it. There is no swelling or œdema of the extremities or under-surface of the abdomen. The appetite is very good and the fæces normal in character. Temp. A.M. 40·3°C. P. 68. R. 20. The hæmatozoon is absent from the blood. Temp. 1 P.M. 40·1°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,026, alkaline, contains albumen, $\frac{1}{23}$rd and a trace of phosphates, also crystals of Carbonate and Oxalate of Calcium.

Two doses of medicine were administered during the day—the former consisted of gr. vii, the latter of gr. iv. Temp. 5 P.M. 38·8°C. P. 64. R. 28.

6th.—This morning the animal's general condition does not appear to have altered to any appreciable extent. The Urticarial eruption which had faded during the previous evening now broke out again on the lower part of the neck, the withers, on the under-surface of the abdomen and on the inner side of the thighs; the rash is not confluent, but the individual patches are very distinct. The visible mucous membranes are clean although somewhat tinged with yellow, and there are no petechiæ on the conjunctivæ. The appetite is good and the fæces normal, but the anus is somewhat patent. Temp. A.M. 37°C. P. 52. R. 16. The hæmatozoon is absent from the blood, the red corpuscles form healthy rouleaux and the white are not increased in number. Temp. 1 P.M. 38°C. Urine, turbid, viscid, orange, Sp. Gr. 1,034, alkaline, contains albumen $\frac{1}{22}$nd, crystals of Carbonate and Oxalate of Calcium.

Two doses of medicine, gr. iv in each, were given during twenty-four hours. Temp. 5 P.M. 38·7°C. P. 52. R. 16.

7th.—There is no change in the general condition of the animal, although it appears somewhat dull. The eruption still persists, but to a limited extent. The conjunctivæ are clean and present no signs of petechiæ. Temp. A.M. 38·7°C. P. 52. R. 16.

The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·7°C. Urine, turbid, orange, viscid, Sp. Gr. 1,030, alkaline, contains albumen $\frac{1}{12}$th, crystals of Carbonate and Oxalate of Calcium. Two doses of medicine were administered during the twenty-four hours. Temp. 5 P.M. 38·7°C. P. 52. R. 20.

8th.—The animal is gradually but progressively losing flesh; the eruption has entirely disappeared this morning, the visible mucous membranes are clear, but there are a few petechiæ present on the conjunctivæ. The abdomen, sheath and limbs are free from any swelling and œdema. The pulse is weak and thready, but the appetite is very good. Temp. A.M. 38·4°C. P. 52. R. 16. The hæmatozoon is absent from the blood. Temp. 1 P.M. 39°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,038, alkaline, contains albumen $\frac{1}{20}$th, but no casts; crystals of Carbonate and Oxalate of Calcium. Two doses of medicine were administered during the twenty-four hours, the former consisting of gr. iv, the latter was raised to gr. vi in consequence of the fresh conjunctival petechiæ. Temp. 5 P.M. 39·3°C. P. 60. R. 16.

9th.—The general condition of the animal is unchanged and there has been no return of the eruption. The appetite is good. Temp. A.M. 39·3°C. P. 60. R. 8. The hæmatozoon is absent from the blood. Temp. 1 P.M. 40·1°C. Urine, turbid, viscid, yellowish-brown in colour, Sp. Gr. 1,042, alkaline, contains a trace of albumen. Two doses of the medicine were administered during the twenty-four hours. Temp. 5 P.M. 40·4°C. P. 64. R. 20.

10th.—The condition of the animal is unchanged except that there is a slight watery discharge from the nostrils. Temp. A.M. 40·3°C. P. 64. R. 12. The hæmatozoon still continues to be absent from the blood. Temp. 1 P.M. 39·5°C. Urine, turbid, viscid, yellow, Sp. Gr. 1,040, alkaline and contains no albumen but Carbonate and Oxalate of Calcium crystals. Two doses of the medicine were administered during the day. Temp. 5 P.M. 40·2°C. P. 64. R. 12.

11th.—This morning the animal presents a dull appearance and there is a muco-purulent discharge from the right nostril. The visible mucous membranes are tinged yellow and there are a few small petechiæ on the conjunctivæ. The pulse is frequent but regular; the respirations have decreased in number during the last thirty-six hours. There is slight localized œdema on the under-surface of the abdomen. Temp. A.M. 40·1°C. P. 64. R 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 40·3°C. Urine, turbid, viscid, bright-yellow, Sp. Gr. 1,026, alkaline and contains albumen $\frac{1}{40}$th, together with numerous crystals of Carbonate and a few Oxalate of Calcium. Two doses of the medicine were administered during the twenty-four hours, each consisting of six grains of the drug in water. Temp. 5 P.M. 40·5°C. P. 64. R. 12.

12th.—This morning the animal looks much brighter, the nasal discharge is less and the visible mucous membranes are cleaner than yesterday but the Urticarial eruption is still visible about the flanks and abdomen. The pulse is frequent but regular; the œdema present on the under-surface of the abdomen is being re-absorbed. The appetite is good and the fæces normal. Temp. A.M. 39·4°C. P. 60. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 39·3°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,028, alkaline, no casts, albumen $\frac{1}{8}$th. Carbonate and Oxalate crystals. The blood of this animal has now been free from the hæmatozoon for a period of eight days. Three

Guinea-pigs were inoculated at 4 P.M. with 0·2 C.C., 0·25 C.C. and 0·3 C.C. respectively of blood drawn from the Jugular Vein in order to ascertain whether it possessed the power of reproducing the disease. Temp. 5 P.M. 40·4°C. P. 64. R. 12. Two doses of the medicine were administered during the twenty-four hours.

13*th*. This morning, at 8 o'clock, the eruption of Urticaria was well marked, presenting large patches on the flanks and abdomen, which gradually faded and by mid-day was hardly perceptible. The visible mucous membranes present a dirty, dusky appearance and there are several fresh petechiæ on the conjunctivæ. The appetite remains good and the fæces normal in character. Temp. A.M. 38·4°C. P. 52. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·5°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,018 alkaline, contains albumen $\frac{1}{11}$th, crystals of Carbonates and Oxalates. Two doses of the medicine were administered during the twenty-four hours of gr. x in all. Temp. 5 P.M. 38·5°C. P. 52. R. 16.

14*th*.—There is no sign of the eruption this morning; the animal appears bright, the visible mucous membranes are cleaner than yesterday and there are no fresh petechiæ present. The appetite is good and the fæces normal in character. Temp. A.M. 38·1°C. P. 64. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·4°C. Urine, turbid, yellowish-brown, Sp. Gr. 1,028, alkaline, albumen $\frac{1}{23}$rd; contains Carbonates and Oxalates of Calcium. Two doses of the medicine were administered during the twenty-four hours. Temp. 5 P.M. 38·2°C. P. 52. R. 16.

15*th*.—This morning the animal looks bright and it would be difficult to say that it was suffering from any disease. The visible mucous membranes are clean and the petechiæ absent from the conjunctivæ. There is no sign of œdema or swelling of the extremities or abdomen. The pulse is full but regular, the appetite very good and excretions normal in character. Temp. A.M. 38·2°C. P. 48. R. 12. The hæmatozoon has again appeared in the blood in small numbers (few). Temp. 1 P.M. 38·3°C. No urine was passed during the day. Two doses of the medicine were administered during the twenty-four hours. Temp. 5 P.M. 39·4°C. P. 60. R. 16.

16*th*.—The temperature has suddenly become elevated, 40·7°C., but the animal appears quite as well as it did yesterday. The pulse is frequent, strong, but regular—64, and the respirations tranquil—12. The hæmatozoa, however, are numerous in the blood. Temp. 1 P.M. 40·8°C. Urine, turbid, orange, Sp. Gr. 1,034, alkaline, contains albumen $\frac{1}{16}$th, together with crystals of Carbonate and Oxalate of Calcium. One dose of Iodic Hydrarg: gr. vi, was given in the morning, but in the evening, as the temperature became elevated, three drachms of Quinine were administered. Temp. 5 P.M. 41·7°C. P. 64. R. 16.

17*th*.—The temperature, which had attained such a height last evening, fell during the night to 2·7°C. and the animal appears bright and walks freely about its box. The visible mucous membranes are tinged with yellow but there are no fresh petechiæ on the conjunctivæ; the pulse is full and strong but markedly dicrotous. There is now no swelling or œdema of the limbs or of the sheath. Appetite good. Temp. A.M. 39°C. P. 68. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 39°C. Urine, clear, orange, Sp. Gr. 1,017, neutral, albumen $\frac{1}{24}$th, crystals of Carbonate and Oxalate of Calcium. Two doses of medicine were administered during the twenty-four hours, the latter consisting of Iodic Hydrarg: gr. vi. Quinæ Sulph. ʒi. Temp. 5 P.M. 39°C. P. 56. R. 24.

18*th*.—The animal presents a very satisfactory appearance, and has improved in every way. Temp. A.M. 37·3°C. P. 52. R. 12. The hæmatozoon is absent from the blood. The red corpuscles form healthy rouleaux and the white are not increased in number. Temp. 1 P.M. 38°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,024, alkaline, contains albumen $\frac{1}{20}$th, crystals of Carbonate and Oxalate of Calcium. The animal received two doses of Iodic Hydrarg: gr. vi and Quinæ Sulph. ʒi on each occasion. Temp. 5 P.M. 38·6°C. P. 52. R. 16.

19*th*.—The animal has developed a slight cough this morning, but otherwise presents the same appearance as yesterday. Temp. A.M. 38·1°C. P. 48. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·2°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,022, acid and contains albumen $\frac{1}{20}$th, crystals of Carbonate and Oxalate Calcium. Two doses of Iodic Hydrarg, each consisting of gr. vi, together with Quinæ Sulph. ʒi, were administered during the day. Temp. 5 P.M. 38·3°C. P. 56. R. 16.

20*th*.—The cough still continues, but only at long intervals and does not appear to distress the animal. The general condition is unchanged, the mucous membranes are clean and free from petechiæ, there is no swelling of the extremities or of the under-surface of the abdomen. The appetite is good and the evacuations normal. Temp. A.M. 38·1°C. P 56. R. 16. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37°C. Urine, turbid, viscid, bright-yellow in colour, Sp. Gr. 1,046, alkaline and contains albumen $\frac{1}{18}$th; crystals of Carbonate and Oxalate of Calcium. Two doses of medicine were administered during the twenty-four hours, Iodic Hydrarg: gr. vi in the morning and Quinæ Sulph. ʒvi at night. Temp. 5 P.M. 38·5°C. P. 52. R. 20.

21st.—The general condition of the animal is unchanged. Temp. 5 P.M. 37·4°C. P. 52. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·1°C. Urine, viscid, turbid, yellow in colour, Sp. Gr. 1,042, alkaline and contains albumen $\frac{1}{20}$th; crystals of Carbonate and Oxalate of Calcium. Two doses of medicine were administered during the twenty-four hours, each consisting of Iodic Hydrarg: gr. vi. Temp. 5 P.M. 40·3°C. P. 60. R. 16.

22nd.—The general condition of the animal is unchanged. Temp. A.M. 39·5°C. P. 60. R. 12. The hæmatozoa are now numerous in the blood. Temp. 1 P.M. 40°C. Urine, turbid, viscid, bright-yellow. Sp. Gr. 1,034, alkaline and contains albumen $\frac{1}{20}$th, crystals as before. In consequence of the Iodic Hydrarg, having little or no effect on the hæmatozoon—the animal has been placed on Arsenic in the form of Liq. Arsenicalis ʒx (gr. v) twice daily in water. Temp. 5 P.M. 40·8°C. P. 64. R. 16.

23rd.—The condition of the animal is unchanged. Temp. A.M. 39·5°C. P. 60. R. 16. The hæmatozoa are numerous in the blood. Temp. 1 P.M. 39·7°C. Urine, clear, viscid, orange in colour, Sp. Gr. 1,030, alkaline and contains albumen $\frac{1}{26}$th crystals of Carbonate and Oxalate of Calcium. Temp. 5 P.M. 40·5°C. P. 64. R. 16. The animal received Arsenic gr. xi. in water during the twenty-four hours.

24th.—This morning the animal appears bright. The visible mucous membranes appear slightly tinged yellow and there are a few petechiæ on the conjunctivæ; the pulse is frequent and weak but regular. The respirations are normal. There is some swelling and œdema round the fetlocks, but it is not painful on pressure. Temp. A.M 39·1°C. P. 64. R. 12. The hæmatozoa are numerous in the blood. Temp. 1 P.M. 39·5°C. Urine, none passed during the day. Two doses of the Arsenic were given during the twenty-four hours, ten grains in all. Temp. 5 P.M. 39·8°C. P. 68. R. 12.

25th.—The general condition of the animal is unchanged. Temp. A.M. 39°C. P. 68. R. 16. The hæmatozoa are numerous in the blood. Temp. 1 P.M 38·6°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,026, alkaline, albumen $\frac{1}{24}$th, no casts, Carbonate and Oxalate crystals. Two doses of the medicine were administered during the twenty-four hours. Temp. 5 P.M. 40°C. P. 64. R. 12.

26th.—This morning the animal appears bright and well; there is however slight œdema of the sheath. The mucous membranes are clean and the conjunctivæ devoid of petechiæ. The pulse is weak and thready, but regular. Temp. A.M. 38·7°C. P. 60. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·8°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,020, alkaline, contains a trace, of albumen, no casts. Two doses of the medicine gr. xiv were administered during the twenty-four hours. Temp. 5 P.M. 38·4°C. P. 60 R. 12.

27th.—The general condition of the animal is unchanged. Temp. A.M. 38°C. P. 48. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·1°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,030, acid and contains albumen $\frac{1}{34}$th. Two doses of the medicine gr. xiv were administered during the twenty-four hours. Temp. 5 P.M. 38·4°C. P. 52. R. 16.

28th.—This morning the animal appears bright; the mucous membranes are perfectly clear. There are no petechiæ on the conjunctivæ. The limbs are free from œdema, as also the under-surface of the abdomen. Temp. A.M. 38·2°C. P. 56. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·2°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,032, acid, contains a trace of albumen, no casts no crystals of Carbonate. Two doses of the medicine were administered during the twenty-four hours. Temp. 5 P.M. 38·4°C. P. 60. R. 16.

29th.—The general condition of the animal is unchanged. Temp A.M. 37·7°C. P. 60. R. 16. The hæmatozoon is absent from the blood. Temp. 1 P.M 38·1°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,040, acid, and contains no albumen, but crystals of Nitrate. Two doses of the medicine were given during the twenty-four hours. Temp. 5 P.M. 38·3°C. P. 60. R. 12.

30th.—The general condition of the animal is still unchanged. Temp. A.M. 37·7°C. P. 52. R. 8. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·7°C. Urine, turbid, viscid, orange, Sp. Gr. 1,040, alkaline, contains no albumen. Two doses of the medicine were administered during the twenty-four hours. Temp. 5 P.M. 37·8°C. P. 56. R. 12.

1st December.—The general condition of the animal is unchanged. There are two fresh petechiæ invading the conjunctivæ of the right eye. Temp. A.M. 37·5°C. P. 44. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·1°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,042, alkaline and contains no albumen. Two doses of medicine were administered during the twenty-four hours, gr. x in all. Temp. 5 P.M. 38°C. P. 60. R. 12.

2nd.—The animal's condition continues to be satisfactory. Temp. A.M. 37·8°C. P. 60. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·6°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,048, alkaline contains no albumen. Two doses of the medicine containing gr. x of Arsenic in all were given. Temp. 5 P.M. 40·4°C. P. 52. R. 12.

3rd.—The animal seems to be progressing very favourably under the Arsenical treatment; it is bright and moves about with ease, the limbs being free from swelling and œdema. The visible mucous membranes present a perfectly healthy appearance. Temp. A.M. 37·4°C. P. 48. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·8°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,048, alkaline, contains no albumen. Two doses of Arsenic, gr. viii, were given during the twenty-four hours. Temp. 5 P.M. 38°C. P. 48. R. 12.

4th.—This morning the animal appears somewhat dull and two petechiæ are visible on the right conjunctiva; otherwise its condition is unaltered. Temp. A.M. 37·5°C. P. 48. R. 8. The hæmatozoon still remains absent from the blood. Temp. 1 P.M. 37·5°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,034, alkaline, contains no albumen. During the past two days the doses of Arsenic have been gradually reduced from xii to viii grains per diem, but owing to the return of petechiæ on the conjunctivæ, the dose has again been increased to vi grains. Temp. 5 P.M. 38.1°C. P. 52. R. 12.

5th.—The animal again looks bright and the small petechiæ observed yesterday on the right conjunctiva have entirely disappeared. The pulse is strong and regular, and respirations normal. Temp. A.M. 37·7°C. P. 56. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·2°C· Urine, turbid, viscid, orange, Sp. Gr. 1,036, alkaline, contains no albumen, Twelve grains of Arsenic were administered during the twenty-four hours. Temp. 5 P.M. 38°C. P. 48. R. 12.

6th.—The condition of the animal is unchanged. Temp, A.M. 37·5°C. P. 44. R. 8. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·6°C. Urine, turbid, viscid, orange, Sp. Gr. 1,040, alkaline, no albumen, but crystals of Carbonate and Oxalate of Calcium. Two doses of Arsenic gr. xii in all were given during the twenty-four hours. Temp. 5 P.M. 37·8°C. P. 44. R. 12.

7th.—The condition of the animal is unchanged. Temp. A.M. 37·6°C. P. 48. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·6°C. Urine, turbid, viscid, orange, Sp. Gr. 1,044, alkaline, contains no albumen, crystals of Carbonate and Oxalate of Calcium. Two doses of Arsenic, gr. xii in all, were given during the twenty-four hours. Temp. 5 P.M. 37·8°C. P. 44. R. 12.

8th.—The condition of the animal is unchanged. Temp. A.M. 37·5°C. P. 44. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·5°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,040, alkaline, no albumen, Carbonates and Oxalates. Twelve grains of Arsenic were administered during the twenty-four hours. Temp. 5 P.M. 37·8°C. P. 44. R. 12.

9th.—This morning the eruption of Urticaria again made its appearance on both sides of the head and neck, along the shoulders, belly and upper portions of the legs. The individual patches were small and almost confluent. The visible mucous membranes are clean, but there are five small petechiæ, red in colour, on the right conjunctiva, but they are absent from the left. The pulse is frequent but weak and of low tension. The appetite is good and the animal does not appear to be in the least affected by the eruption. Temp. A.M. 37·7°C. P. 52. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,038, alkaline, contains no albumen, but crystals of Carbonate and Oxalate of Calcium. Twelve grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·2°C. P. 60. R. 12.

10th.—The eruption was faintly visible early this morning but again broke out at 11 A.M. on the neck, chest, shoulder and hips; some of the patches were larger than those observed yesterday, but most of them were not so distinct. The general condition of the animal is unchanged. Temp. A.M. 37·8°C. P. 52. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·6°C. Urine, turbid, viscid, greenish-yellow in colour, Sp. Gr. 1,040, alkaline, contains no albumen. Twelve grains of Arsenic were given during the twenty-four hours. Temp 5 P.M. 38°C. P. 56. R. 16.

11th.—This morning although the animal presents a bright appearance there is well marked œdema of the under-surface of the belly. The visible mucous membranes are clean and so also are the conjunctivæ. The Urticarial eruption is still present on the neck, hips and extremities, but the individual patches are small. Temp. A.M. 37·4°C. P. 52. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,030, alkaline, contains no albumen. Two doses of Arsenic, grains xii in all, were given in water during the twenty-four hours. Temp. 5 P.M. 38°C. P. 60. R. 12.

12th.—The eruption of Urticaria is still present, but the general condition of the animal remains unchanged. Temp. A.M. 37·6°C. P. 56. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·8°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,032, alkaline and contains no albumen, but only crystals of Carbonates and Oxalates. Fourteen grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 39·2°C. P. 56. R. 12.

13*th.*—The eruption, although very faint, is still observable. The œdema on the under-surface of the abdomen has increased in amount, and in addition the sheath is somewhat swollen, and the hind extremities below the hocks. The animal is not losing flesh at the present time, although during the first week in this Hospital the loss was considerable. The appetite is good and the evacuations natural in character. Temp. A.M. 37·6°C. P. 52. R. 8. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·2°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,030, alkaline, no casts, epithelial cells from bladder, Carbonates, no Oxalates. Fourteen grains of Arsenic were given in the twenty-four hours. Temp. 5 P.M. 38·2°C. P. 52. R. 12.

14*th.*—The condition of the animal is unchanged. Temp. A.M. 37·6°C. P. 52. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·8°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,036, alkaline, contains no albumen, no casts. Fourteen grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·1°C. P. 52. R. 12.

15*th.*—The condition of the animal is unchanged. Temp. A.M. 37·5°C. P. 48. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·6°C. Urine, turbid, viscid, yellow, Sp. Gr. 1,029, alkaline, contains neither albumen nor casts. Fourteen grains of Arsenic were administered during the twenty-four hours. Temp. 5 P.M. 37·7°C. P. 56. R. 12.

16*th.*—The animal presents a dull appearance; the eruption is still faintly marked. The visible mucous membranes are clean, although the conjunctivæ are somewhat injected; no petechiæ are visible. The pulse is weak and easily compressible. The swelling of the sheath has increased in amount and the exudation has now reached the front of the chest between the fore-limbs. There is swelling and œdema of the extremities between the fetlocks and hocks. Temp. A.M. 37·5°C. P. 52. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·4°C. Urine, turbid, viscid, yellow, Sp. Gr. 1,032, alkaline, and contains crystals of Carbonate of Lime only. Twelve grains of Arsenic were given in water during the twenty-four hours. Temp. 5 P.M. 38·1°C. P. 52. R. 12.

17*th.*—The condition of the animal is unchanged. Temp. A.M. 37·8°C. P. 56. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·8°C. Urine, turbid, viscid, yellow, Sp. Gr. 1,030, alkaline and contains numerous Calcium Carbonate crystals. Ten grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·2°C. P. 40. R. 12.

18*th.*—The general condition of the animal is unchanged. The eruption is still present on the neck, chest and upper part of the extremities, although the individual patches remain small and less distinct than usual. There are two petechiæ involving the conjunctiva of the right eye and one petechia in the left, all of a bright-red colour. The temperature is normal—37·4°C. The pulse is 52; the beat is somewhat abrupt but of low tension. The breathing is tranquil—12. The swelling and œdema of the sheath, under-surface of the abdomen and extremities has, if anything, increased in amount since the last record. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·8°C. Urine, turbid, viscid, yellow, Sp. Gr. 1,032, alkaline, and contains numerous Calcium Carbonate crystals. Ten grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38°C. P. 48. R. 12.

19*th.*—This morning the eruption has entirely disappeared from the skin; the animal is brighter but the swelling and œdema of the sheath has increased in amount. Temp. A.M. 37·2°C. P. 48. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·3°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,028, alkaline, contains no albumen. Six grains of Arsenic were given during the day. Temp. 5 P.M. 38°C. P. 48. R. 12.

20*th*—The general condition of the animal remains unchanged. Temp. A.M. 37·3°C. P. 48 R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·3C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,029, alkaline and contains no albumen. Six grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·2°C. P. 44. R. 20.

21*st.*—The general condition of the animal is unchanged. Temp. A.M. 37·4°C. P. 40. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·8°C. Urine, turbid, viscid, greenish-yellow in colour, Sp. Gr. 1,032, alkaline, contains no albumen. Six grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 37·6°C. P. 44. R. 12.

22*nd.*—The general condition of the animal is unchanged. Temp. A.M. 37·4°C. P. 44. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·5°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,032, alkaline, contains no albumen. Six grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 37·4°C. P. 40. R. 8.

23*rd.*—The general condition of the animal is unchanged. Temp. A.M. 37·4°C. P. 36. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·3°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,030, alkaline, contains no albumen. Six grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 37·8°C. P. 52. R. 12.

24*th.*—The general condition of the animal is unchanged. Temp. A.M. 37·2°C. P. 36. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·2°C. Urine, turbid, viscid, greenish-yellow in colour, Sp. Gr. 1,038, alkaline, contains no albumen. Six grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·1°C. P. 56. R. 16

25th.—There is little change to note, with the exception that this morning numerous large petechiæ have appeared on the conjunctivæ, of a bright-red colour. The swelling and œdema of the sheath has decreased. Temp. A.M. 37·2°C. P. 32. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·3°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,040, alkaline, contains no albumen, but a few granular casts and crystals of Calcium Carbonate. Three grains of Arsenic were given for the morning dose, owing to the extensive conjunctival petechiæ. The dose has been increased to grains four bis die. Temp. 5 P.M. 37·8°C. P. 32. R. 12. The animal was exercised at 8 A.M. and 4 P.M.

26th.—The condition of the animal is unchanged. Temp. A.M. 37·6°C. P. 28. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,032, alkaline, contains no albumen and no granular casts. Eight grains of Arsenic were administered during the twenty-four hours. Temp. 5 P.M. 38·4°C. P. 36. R. 16. Exercised morning and evening.

27th.—The animal presents a bright appearance. The visible mucous membranes are clean. There are a few, very small red points dotted over the right conjunctiva, but the left is free from them. The pulse is normal as regards frequency, but the beat is somewhat weak and the respirations this morning are sub-normal. A little œdema is still present round the hind fetlocks, but the swelling and œdema of the sheath decreases slightly each day. The appetite is good and the evacuations healthy. Temp. A.M. 38·2°C. P. 32. R. 8. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·2°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,032, alkaline, contains no albumen but numerous crystals of Calcium Carbonate and a few Oxalates. Eight grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·5°C. P. 36. R. 12. Exercised for 15 minutes morning and evening.

28th.—The condition of the animal is unchanged. Temp. A.M. 37·5°C. P. 32. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·4°C. Urine, turbid, viscid, yellow in colour. Sp. Gr. 1,034, alkaline, contains no albumen. Eight grains of Arsenic were given during the twenty-four hours. The animal was exercised in the morning and evening. Temp. 5 P.M. 38·2°C. P. 40. R. 12.

29th.—The general condition of the animal is unchanged. Temp. A.M. 38·1°C. P. 32. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·7°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,036, alkaline, contains no albumen. Eight grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·4°C. P. 40. R. 12.

30th.—The condition of the animal is unchanged. Temp. A.M. 38°C. P. 32. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,030, alkaline, contains no albumen. Eight grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·5°C. P. 32. R. 12.

31st.—The condition of the animal is unchanged. Temp. A.M. 38°C. P. 32. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,030, alkaline, contains no albumen. Eight grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·7°C. P. 36. R. 12.

1st January 1893.—The condition of the animal is unchanged. Temp. A.M. 37·6°C. P. 36. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·7°C. Urine, turbid, viscid, greenish-brown in colour, Sp. Gr. 1,030, alkaline, contains no albumen. Three grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·4°C. P. 36. R. 12.

2nd.—The condition of the animal is unchanged. Temp. A.M. 38·5°C. P. 32. R. 16. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·6°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,032, alkaline, no albumen. Three grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 39·1°C. P. 32. R. 16.

3rd.—The general condition of the animal is unchanged. Temp. A.M. 38·2°C. P. 32. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 39°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,032, alkaline, no albumen. Seven grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 39·4°C. P. 32. R. 12.

4th.—The condition of the animal is unchanged. Temp. A.M. 38·1°C. P. 32. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·8°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,032, alkaline, contains no albumen. Eight grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·6°C. P. 32. R. 12.

5th.—The condition of the animal is unchanged. Temp. A.M. 38·°C. P. 32. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·4°C. Urine, turbid, viscid, yellowish-brown in colour, Sp. Gr. 1,038, alkaline, contains a trace of albumen. Eight grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·5°C. P. 28. R. 12.

6th.—The condition of the animal is unchanged. Temp. A.M. 38·3°C. P. 36. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·6°C. Urine, turbid, viscid, brown in colour, Sp. Gr. 1,028, alkaline, contains no albumen. Eight grains of Arsenic were given during the twenty-four hours. Temp. 5 P M. 38·4°C. P. 48. R. 12.

7th.—The condition of the animal is unchanged. Temp. A.M. 37·7°C. P. 32. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·4°C. Urine, turbid, viscid, brown in colour, Sp. Gr. 1,032, alkaline, contains no albumen. Eight grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·4°C. P. 32. R. 12.

8th.—The condition of the animal is unchanged. Temp. A.M. 38·4°C. P. 40. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·8°C. Urine, turbid, viscid, brown in colour, Sp. Gr. 1,036, alkaline, contains no albumen. Eight grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·7°C. P. 32. R. 12.

9th.—The condition of the animal is unchanged. Temp. A.M. 38·2°C. P. 32. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·2°C. Urine, turbid, viscid, dark-brown in colour, Sp. Gr. 1,030, alkaline, contains albumen $\frac{1}{40}$th. Exercised in the morning and evening. Eight grains of Arsenic were given during the twenty-four hours Temp. 5 P.M. 38°C. P. 32. R. 16.

10th.—The condition of the animal is unchanged. Temp. A.M. 38·1°C. P. 32. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·8°C. Urine, turbid, viscid, dark-brown in colour, Sp. Gr. 1,032, alkaline, contains albumen $\frac{1}{11}$th. Eight grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·3°C. P. 32. R. 12. Exercised in the morning and evening.

11th.—The condition of the animal is unchanged. Temp. A.M. 37·5°C. P. 32. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·5°C. Urine, turbid, viscid, brown in colour, Sp. Gr. 1023, alkaline, contains albumen $\frac{1}{40}$th. Nine grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38°C. P. 36. R. 12. Exercised in the morning and evening.

12th.—The condition of the animal is unchanged. Temp. A.M. 37·3°C. P. 32. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·6°C. Urine, turbid, viscid, brown in colour, Sp. Gr. 1,024, alkaline, contains albumen $\frac{1}{30}$th. Nine grains of Arsenic were given during the twenty-four hours. The animal was exercised in the morning and evening. Temp. 5 P.M. 38·4°C. P. 36. R. 12.

13th.—The condition of the animal is unchanged. Temp. A.M. 37·4°C. P. 32. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·2°C. Urine, turbid, viscid, dark-brown in colour, Sp. Gr. 1,032, alkaline, contains a trace of albumen. Ten grains of Arsenic were given during the twenty-four hours. The animal was exercised in the morning and evening. Temp. 5 P.M. 38·4°C. P. 40. R. 12.

14th.—The condition of the animal is unchanged. Temp. A.M. 37·6°C. P. 32. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·1°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,032, alkaline, contains a trace of albumen. Ten grains of Arsenic were given during the twenty-four hours. The animal was exercised in the morning and evening. Temp. 5 P.M. 38·3°C. P. 40. R. 12.

15th.—The condition of the animal is unchanged. Temp. A.M. 37·8°C. P. 32. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·3°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,032, alkaline, contains no albumen. Ten grains of Arsenic were given during the twenty-four hours. The animal was exercised in the morning and evening. Temp. 5 P.M. 38·1°C. P. 32. R. 12.

16th.—The condition of the animal is unchanged. Temp. A.M. 38·3°C. P. 32. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·2°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,036, alkaline, contains no albumen. Ten grains of Arsenic were given during the twenty-four hours. The animal was exercised in the morning and evening. Temp. 5 P.M. 38·1°C. P. 36. R. 12.

17th.—The condition of the animal is unchanged. Temp. A.M. 37·4°C. P. 32. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·4°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,030, alkaline, contains no albumen. Nine grains of Arsenic were given during the twenty-four hours. The animal was exercised in the morning and evening. Temp. 5 P.M. 38·2°C. P. 32. R. 12.

18th.—The condition of the animal is unchanged. Temp. A.M. 37·2°C. P. 32. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·4°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1034, alkaline, no albumen. Nine grains of Arsenic were given during the twenty-four hours. The animal was exercised in the morning and evening. Temp. 5 P.M. 38·6°C. P. 36. R. 12.

19th.—The animal presents a fairly bright appearance, but during the past three days has lost somewhat in condition, the glutei muscles more especially having become reduced in bulk. The visible mucous membranes are clear, but there are a few minute petechiæ on the conjunctival membranes. The pulse-beat is strong and regular, 36 per minute, the breathing being also normal—12. The appetite is good and the fæces natural in character. Temp. A.M. 37·5°C. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,028, alkaline, no albumen. Nine grains of Arsenic were given during the twenty-four hours. Exercise has been countermanded in order to observe whether it has any effect on the progressive emaciation. Temp. 5 P.M. 38°C. P. 36. R. 12.

20th.—The condition of the animal is unchanged. Temp. A.M. 37°C. P. 28. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·1°C. Urine, turbid, viscid, greenish-yellow in colour, Sp. Gr. 1,038, alkaline, contains no albumen. Eight grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·3°C. P. 36. R. 12.

21st.—The condition of the animal is unchanged. Temp. A.M. 37·8°C. P. 32. R. 16. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·1°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1036, alkaline, contains no albumen. Eight grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·6°C. P. 36. R. 12.

22nd.—The condition of the animal is unchanged. Temp. A.M. 37·8°C. P. 28. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·7°C. Urine, turbid, viscid, brown in colour, Sp. Gr. 1,032, alkaline, contains no albumen. Eight grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·2°C. P. 36. R 12.

23rd.—The condition of the animal is unchanged. Temp. A.M. 37·8°C. P. 32. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·4°C. Urine, turbid, viscid, bright-yellow in colour, Sp. Gr. 1,032, alkaline, contains no albumen. Eight grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·5°C. P. 44. R. 12.

24th.—The condition of the animal is unchanged. Temp. A.M. 37·6°C. P. 32. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·7°C. Urine, turbid, viscid, bright-yellow in colour, Sp. Gr. 1035, alkaline, contains no albumen. Eight grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·5°C. P. 36. R. 12.

25th.—The condition of the animal is unchanged. Temp. A.M. 37·7°C. P. 32. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·2°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,036, alkaline, contains no albumen. Eight grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·2°C. P. 36. R. 12.

26th.—The condition of the animal is unchanged. Temp. A.M. 37·5°C. P. 32. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·3°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,038, alkaline, contains no albumen. Eight grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 37·4°C. P. 32. R. 12.

27th.—The condition of the animal is unchanged. Temp. A.M. 38·4°C. P. 32. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·1°C. Urine, turbid, viscid, orange-yellow in colour, Sp. Gr. 1,040, alkaline, contains no albumen. Eight grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 39·2°C. P. 44. R. 12.

28th.—The condition of the animal is unchanged. Temp. A.M. 38·5°C. P. 44. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 39·3°C. Urine, turbid, viscid, orange-yellow in colour, Sp. Gr. 1,038, alkaline, contains no albumen. Ten grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 39·2°C. P. 44. R. 12.

29th.—The condition of the animal is unchanged. Temp. A.M. 37·5°C. P. 40. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·1°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,040, alkaline, contains no albumen. Ten grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 39·3°C. P. 36. R. 8.

30th.—The condition of the animal is unchanged. Temp. A.M. 38·4°C. P. 36. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·8°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,040, alkaline, contains no albumen. Nine grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 39·2°C. P. 48. R. 8.

31st.—The condition of the animal is unchanged. Temp. A.M. 38·6°C. P. 36. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M., 38·2°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,030, alkaline, contains no albumen. Eight grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 39·2°C. P. 44. R. 8.

1st February.—The condition of the animal is unchanged. Temp. A.M. 37·6°C. P. 36. R. 8. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·5°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,036, alkaline, contains no albumen. Eight grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·5°C. P. 40. R. 8.

2nd.—The condition of the animal is unchanged. Temp. A.M. 37·4°C. P. 40. R. 8. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·5°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,030, alkaline, contains no albumen. Eight grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·5°C. P. 52. R. 8.

3rd.—The condition of the animal is unchanged. Temp. A.M. 36·8°C. P. 44. R. 8. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38°C. Urine, turbid, viscid, dark-brown in colour, Sp. Gr. 1,038, alkaline, contains albumen $\frac{1}{12}$th. Eight grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·7°C. P. 48. R. 8.

4th.—The condition of the animal is unchanged. Temp. A.M. 36·7°C. P. 32. R. 8. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·6°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,034, alkaline, contains no albumen. Eight grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·1°C. P. 40. R. 10.

5th.—The condition of the animal is unchanged. Temp. A.M. 37·3°C. P. 28. R. 8. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·6°C. Urine, turbid, yellow in colour, Sp. Gr. 1,026, alkaline, contains no albumen. Eight grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 37·8°C. P. 40. R. 12.

6th.—The condition of the animal is unchanged. Temp. A.M. 36·7°C. P. 36. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·7°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,036, alkaline, contains no albumen. Eight grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 37·5°C. P. 44. R. 8.

7th.—The condition of the animal is unchanged. Temp. A.M. 36·6°C. P. 52. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·4°C. Urine passed but none collected. Eight grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 37·1°C. P. 52. R. 10.

8th.—The condition of the animal is unchanged. Temp. A.M. 35·8°C. P. 36. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37°C. Urine passed but none collected. Eight grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 37·5°C. P. 52. R. 8.

9th.—The condition of the animal is unchanged. Temp. A.M. 37·1°C. P. 40. R. 10. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·3°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,046, alkaline, contains no albumen. Eight grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 37·7°C. P. 48. R. 12.

10th.—The condition of the animal is unchanged. Temp. A.M. 37·3°C. P. 52. R. 8. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,036, alkaline, contains no albumen. Eight grains of Arsenic were given during the twenty-four hours. Temp 5 P.M. 38·4°C. P. 60. R. 8.

11th.—The condition of the animal is unchanged. Temp. A.M. 37·1°C. P. 48. R. 8. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·6°C. Urine, turbid, orange-yellow in colour, Sp. Gr. 1,012, alkaline, contains no albumen. Eight grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·6°C. P. 48. R. 8.

12th.—The condition of the animal is unchanged. Temp. A.M. 37·6°C. P. 48. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·°C. Urine, turbid, orange in colour, Sp. Gr. 1,038, alkaline, contains no albumen. Eight grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 37·8°C. P. 52. R. 12.

13th.—The animal shows some slight weakness in the hind extremities, but appears to have no difficulty in maintaining the upright position; however, as a precautionary measure, it was placed in slings. Temp. A.M. 36·4°C. P. 40. R. 8. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·4°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,030, alkaline, contains no albumen. Eight grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·1°C. P. 48. R. 12.

14th.—The condition of the animal is unchanged. Temp. A.M. 37·4°C. P. 44. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·6°C. Urine, passed but none collected. Eight grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·4°C. P. 52. R. 12.

15th.—The condition of the animal is unchanged. Temp. A.M. 37°C. P. 36. R. 8. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·7°C. Urine, passed but none collected. Eight grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·7°C. P. 44. R.16.

16th.—The animal is somewhat weaker to-day, but is still able to maintain the upright position. The appetite is good. Temp. A.M. 37°C. P. 56. R. 20. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·6°C. Urine, none was passed during the day. Four grains of Arsenic were given to the animal in the morning. Temp. 5 P.M. 38·3°C. P. 60. R. 32.

17th.—This morning the animal is lying down and is unable to rise. It still however is able to lift up its head in order to eat its corn and drink water from a bucket. Temp. A.M. 37·4°C. P. 52. R. 16. The hæmatozoon is absent from the blood. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,032, alkaline, contains albumen $\frac{1}{35}$th. Chloroform was administered at 1-20 P.M., and death took place at 1-30 P.M.

AUTOPSY.—The body is somewhat emaciated. There is an entire absence of œdema from the extremities and the under-surface of the abdomen.

On Section—The tissues of the body present an orange colour.

Thorax.—The right pleural cavity contains 3 ozs. and the left 4 ozs. of a turbid, orange-coloured fluid, but there are no adhesions of the pleuræ.

Lungs.—The surface of the *right* presents a variegated appearance; the general hue is yellow. The anterior lobule is of a reddish-yellow colour and is the seat of emphysema. Just behind this, and occupying the anterior portion of the organ, is a slightly raised patch measuring 7″ × 5″ × 2·5″, somewhat hard to the touch, over which the pleura is of a yellowish colour, due to a thin layer of solid exudation lying between its under-surface and the pulmonary tissue.

On section.—The tissues present a yellowish-red colour; those of the individual lobules are consolidated and in some instances the latter are insulated by a thin layer of exudation. On passing the hand over the pleural surfaces of the posterior portion of the organ several small nodules can be felt varying in size from $\frac{1}{4}$th to $\frac{7}{12}$th of an inch in diameter. On section they are found to consist of a central portion which has undergone caseation and are surrounded by fibrous tissue; whilst the remaining portion of the lung is well filled with air, and the naked-eye appearances are healthy.

The pleural surfaces of the *left* lung also present a variegated appearance and a few nodules are felt on passing the hand over them. *On section,* the tissues present an orange colour, while on pressure, dark-coloured fluid exudes from the cut ends of the vessels.

The cavity of the *pericardium* contains nearly ten ounces of a turbid, light-orange-coloured fluid, in which on microscopical examination no hæmatozoa can be discovered.

Heart—Is somewhat small; weighs 5 lbs. 2 ozs., devoid of clots. The base is surrounded by a yellow-coloured exudation, having the consistency of jelly, but both this and the muscular structure are free from petechiæ. *On section,* the right side of the heart is somewhat dilated, and contains dark-coloured clots bathed in fluid blood, but no sub-endocardial extravasations. The left side is contracted and also contains a small amount of dark clot, but there are no sub-endocardical extravasations. Valves without alteration.

Abdominal Cavity—Contains 6 ozs. of a blood-stained fluid.

Liver—Somewhat small, weighs 9 lbs. 12 ozs., is firm to the touch. Its surface presents signs of old perihepatitis, the capsule being slightly opalescent. There are numerous small calcareous bodies of a yellowish colour, which show through Glisson's capsule. *On section,* the tissues are dark-chocolate in colour, somewhat firm under the knife. The lobules are large and their colour uniform. Numerous small calcareous bodies are seen to invade the substance of the organ.

Spleen—Is normal in size and weighs 1 lb. 14 ozs. *Externally,* yellowish-white coloured, and dotted over with a few brick-red petechiæ. *On section,* dark-brown-red; follicles normal in size.

Kidneys.—Right weighs 1 lb. 10 ozs. Left 1 lb. 7 ozs. Both organs present a healthy appearance.

Stomach.—Small. *On section,* it was found to contain a small quantity of semi-digested food. *Cuticular* portion healthy. *Villous portion* also presents a healthy appearance, with the exception of a small '*Spiroptera*' tumor, circular in form, one inch in diameter, situated at the fundus of the organ one inch from the line of demarcation.

Small and Large Intestines—Present a healthy appearance. Two small specimens of the "*Strongylus Armatus*" were found in the cæcum.

Bladder.—Contracted. No change in mucous membrane.

Remarks.—This animal, an Australian Gelding, aged 7 years, was purchased by the Bombay Tramway Company on the 17th April 1892. Fever developed on the 14th October 1892, after having been in the country exactly six months. A general eruption of Urticaria appeared on the 24th October, and the hæmatozoon was discovered in the blood on the 30th. The animal was admitted into the Laboratory Hospital on the 31st October on the 2nd day of the disease. Treatment was commenced at once, as the animal showed marked loss in condition, and the disease was progressive. The treatment consisted in the administration of Iodic Hydrarg (the soluble Double Iodide of Mercury and Potassium) in gradually increasing doses, commencing with gr. ii up to a maximum of gr. vij and at a later date varying the doses according to the condition of the patient. Between the 3rd and 8th of November the Urticarial eruption appeared every morning but faded by midday on that date. The hæmatozoon, which disappeared from the blood on the 7th morning of the disease, remained absent for a period of ten days, re-appearing on the morning of the 17th day. On the 14th day of the disease and 8th of the intermission three Guinea-pigs were subcutaneously inoculated with blood (each receiving 0·2c.c., 0·25c.c. and 0·3c.c. respectively), drawn from the Jugular Vein of the animal, in order to discover whether any immature form was present in the circulation during the absence of the hæmatozoon. Hæmatozoa were found, on microscopical examination, in the blood of the two latter Guinea-pigs, after a period of twelve days, and in that of the former after seventeen days. Continued fever was present with occasional exacerbations, and well marked but short intermissions occurring at irregular intervals. As Iodic Hydrarg proved incapable of arresting the development of the hæmatozoon, on the 18th day of the disease Quinæ Sulph. was added until the evening of the 22nd. But as the organism re-appeared in the blood on the 24th, Arsenic gr. v. *bis die* was substituted with a Temp. of 40·8°C. On the morning of the 28th day of the disease, after the animal had taken seven doses of the Arsenic, the organism was found to be absent from the blood—Temp. 38·7°C. P. 60. R. 12—and it remained so during a period of 83 days. A few days after the commencement of the Arsenical treatment, the Urticarial eruption again broke out, and was daily more or less marked until the 19th December when it finally disappeared. As on the 111th day the animal was weak and had difficulty in maintaining the upright position, Chloroform was administered and death took place.

RECORDS OF URINE.

Animal Bay Australian Gelding No. LXXIII. Date, 31st October 1892.
Disease, Surra (naturally acquired).

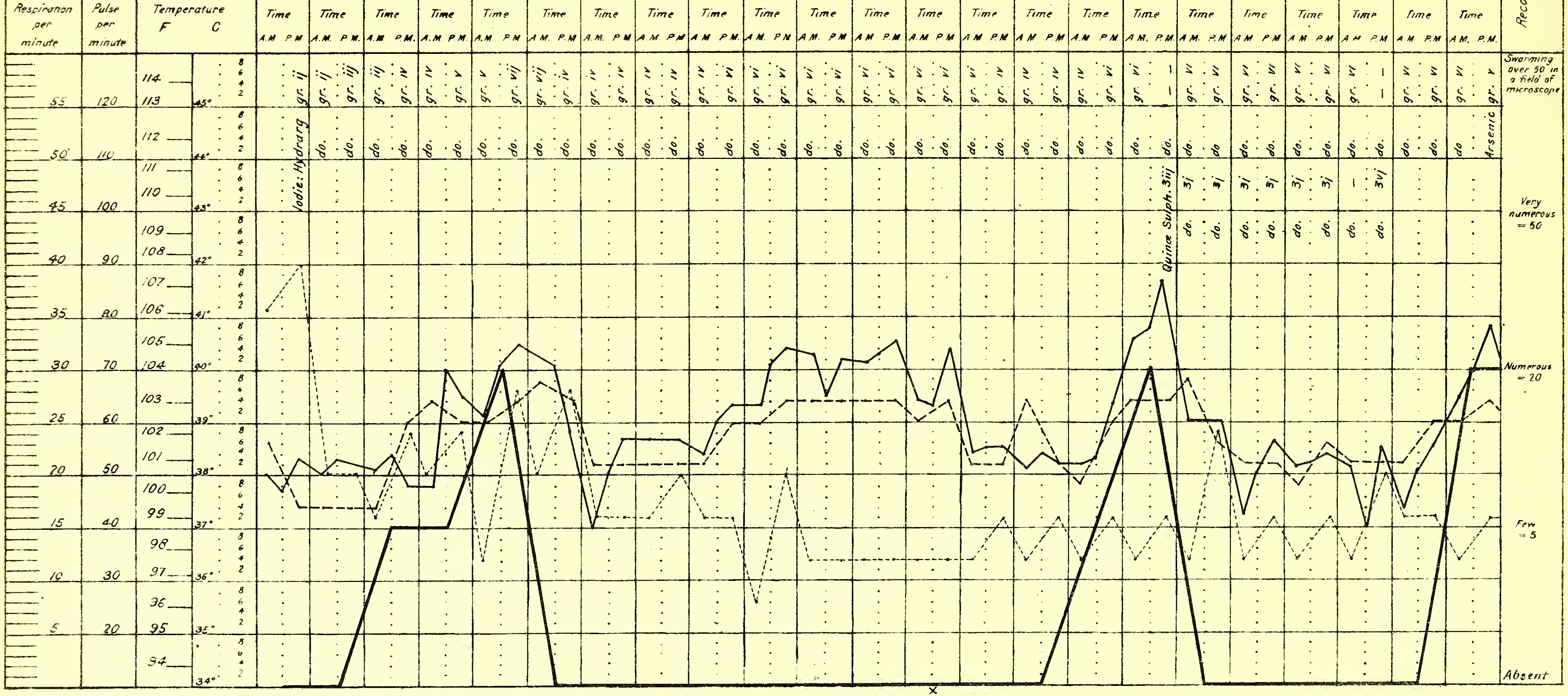
Date.	Quantity.	Colour.	Re-action.	Specific Gravity.	Albumen.	Phosphates.	REMARKS.
1892.							
October 31	...	Turbid, yellow	Alkaline	1,018	Nil	Considerable amount.	Carbonates and oxalates of calcium.
November 1	...	Turbid, orange	Acid	1,034	Trace	Nil	Do. do.
2	...	Turbid, viscid, orange.	Do.	1,032	Slight trace.	Nil	Do. do.
3	...	Turbid, viscid, yellow.	Alkaline	1,040	Nil	Nil	Do. do.
4	...	Do.	Do.	1,018	Nil	Nil	Do. do.
5	...	Do.	Do.	1,026	1/23rd	A trace	Do. do.
6	...	Turbid, viscid, orange.	Do.	1,034	1/22nd	Nil	Do. do.
7	...	Do.	Do.	1,030	1/12th	Nil	Do. do.
8	...	Turbid, viscid, yellow.	Do.	1,038	1/20th	Nil	Do. do.
9	...	Turbid, viscid, yellowish brown.	Do.	1,042	A trace.	Nil	Do. do.
10	...	Turbid, viscid, yellow-creamy.	Do.	1,040	Nil	Nil	Do. do.
11	...	Turbid, viscid, bright-yellow.	Do.	1,026	1/40th	Nil	No casts, carbonate and oxalate crystals.
12	...	Turbid, viscid, orange.	Do.	1,028	1/8th	Nil	Do. do.
13	...	Do.	Do.	1,018	1/11th	Nil	Do. do.
14	...	Turbid, viscid, yellowish-brown.	Do.	1,028	1/23rd	Nil	Do. do.
15	No urine passed during the day			...	...	......	
16	...	Turbid, viscid, orange.	Alkaline	1,034	1/16th	Nil	Do. do.
17	...	Clear orange	Neutral	1,017	1/24th	Nil	Do. do.
18	...	Turbid, viscid, orange.	Alkaline	1,024	1/20th	Nil	Do. do.
19	...	Do.	Acid	1,022	1/20th	Nil	Do. do.
20	...	Turbid, viscid, bright-yellow.	Alkaline	1,046	1/18th	Nil	Do. do.
21	...	Turbid, viscid, yellow.	Do.	1,042	1/20th	Trace	Do. do.
22	...	Do.	Do.	1,034	1/26th	A trace	Do. do.
23	...	Turbid, viscid, orange.	Do.	1,030	1/26th	Nil	Do. do.
24	No urine passed during the day			...	...	......	
25	...	Turbid, viscid, orange.	Alkaline	1,026	1/24th	Nil	Do. do.
26	...	Do.	Do.	1,020	Trace	A trace	No casts, no carbonates, a few oxalates.
27	...	Do.	Acid	1,030	1/34th	Do.	Do. do.
28	...	Do.	Do.	1,032	A trace.	Considerable amount.	No casts, colourless crystals and no carbonates.
29	...	Do.	Do.	1,040	Nil	Trace	No casts, carbonates and oxalates.
30	...	Do.	Alkaline	1,040	Nil	Nil	Do. do.
December 1	...	Do.	Do.	1,042	Nil	Nil	No casts, some epithelium, carbonate of calcium.
2	...	Turbid, viscid, yellow.	Do.	1,048	Nil	Nil	No casts, carbonates of calcium.
3	...	Do.	Do.	1,048	Nil	Nil	Do. do.
4	...	Do.	Do.	1,048	Nil	Nil	Do. do.
5	...	Turbid, viscid, orange.	Do.	1,036	Nil	Nil	Do. do,
6	...	Do.	Do.	1,040	Nil	Nil	Do. do.
7	...	Do.	Do.	1,044	Nil	Nil	Do. do.
8	...	Do.	Do.	1,040	Nil	Nil	Do. do.
9	...	Turbid, viscid, orange.	Alkaline	1,038	Nil	Nil	Do. do.
10	...	Turbid, viscid, greenish-yellow.	Do.	1,040	Nil	Nil	Do. do.
11	...	Turbid, viscid, orange-yellow.	Do.	1,030	Nil	Nil	Do. do.
12	...	Turbid, viscid, yellow.	Do.	1,032	Nil	Nil	Do. do.
13	...	Do.	Do.	1,030	Nil	Nil	Do. do.
14	...	Turbid, viscid, greenish-yellow.	Do.	1,036	Nil	Nil	No casts, some bladder epithelium and carbonate of calcium crystals.
15	...	Turbid, viscid, yellow.	Do.	1,029	Nil	Nil	No casts, crystals of carbonate of calcium.
16	...	Do.	Do.	1,032	Nil	Nil	Do. do.
17	...	Do.	Do.	1,030	Nil	Nil	Do. do.
18	...	Do.	Do.	1,032	Nil	Nil	Do. do.
19	...	Do.	Do.	1,028	Nil	Nil	Do, do.
20	...	Turbid, viscid, orange.	Do.	1,029	Nil	Nil	Do. do.
21	...	Turbid, viscid, greenish-yellow.	Do.	1,032	Nil	Nil	Do. do.
22	...	Turbid, viscid, yellow.	Do.	1,032	Nil	Nil	No casts, large crystals of calcium carbonate no oxalates.
23	...	Do.	Do.	1,030	Nil	Nil	Do. do.
24	...	Turbid, viscid, greenish-yellow.	Do.	1,038	Nil	Nil	Do. do.
25	..	Turbid, viscid, yellow.	Do.	1,040	Nil	Nil	Do. do.
26	...	Do.	Do.	1,032	Nil	Nil	Do. do.
27	...	Do.	Do.	1,032	Nil	Nil	Do. do.
28	...	Do.	Do.	1,034	Nil	Nil	Do. do.
29	...	Do	Do.	1,036	Nil	Nil	Do. do.
30	...	Do.	Do.	1,030	Nil	Nil	Do do.
31	...	Do.	Do.	1,030	Nil	Nil	Do. do.

Date.		Quantity.	Colour.	Re-action.	Specific Gravity.	Albumen.	Phosphates.	Remarks.
1893.								
January	1	...	Turbid, viscid, greenish-brown.	Alkaline	1,030	Nil	Nil	No casts large crystals of calcium carbonate no oxalates.
	2	...	Turbid, viscid, yellow.	Do.	1,032	Nil	Nil	Do. do
	3	...	Do.	Do.	1,032	Nil	Nil	Do. do.
	4	...	Do.	Do.	1,032	Nil	Nil	Do. do.
	5	...	Turbid, viscid, yellowish-brown.	Do.	1,038	A trace.	Nil	Do. do.
	6	...	Turbid, viscid, brown.	Do.	1,028	Nil	Nil	Do. do.
	7	...	Turbid, viscid. yellow.	Do.	1,032	Nil	Nil	Do. do.
	8	...	Turbid, viscid, brown.	Do.	1,036	Nil	......	Large quantity of calcium carbonate crystals, no oxalates, no casts.
	9	...	Turbid, viscid, dark-brown.	Do.	1,030	1/40th	......	Do. do.
	10	...	Do.	Do.	1,032	1/11th	......	Do- do.
	11	...	Turbid, viscid, brown.	Do.	1,023	1/40th	......	Do. do.
	12	...	Do.	Do.	1,024	1/30th	......	Do. do.
	13	...	Turbid, viscid, dark-brown.	Do.	1,032	A trace.	......	Do. do.
	14	...	Turbid, viscid, yellow.	Do.	1,032	A trace.	......	Do. do.
	15	...	Do.	Do.	1,032	Nil	......	Do. do.
	16	...	Do.	Do.	1,036	Nil	......	Do. do.
	17	...	Do.	Do.	1,030	Nil	......	Do. do.
	18	...	Turbid, viscid, orange.	Do.	1,034	Nil	......	Do- do.
	19	...	Do.	Do.	1,028	Nil	......	Do. do.
	20	...	Turbid, viscid, greenish-yellow.	Do.	1,038	Nil	......	Do. Trace of bile pigment.
	21	...	Turbid, viscid, yellow.	Do.	1,036	Nil	......	Do. do.
	22	...	Turbid, viscid, brown.	Do.	1,032	Nil	......	Do. do.
	23	...	Turbid, viscid, bright-yellow.	Do.	1,032	Nil	......	Large quantity of calcium carbonate crystals, few oxalates, no bile pigment.
	24	...	Do.	Do.	1,035	Nil	......	Do. do.
	25	...	Turbid, viscid, orange.	Do.	1,036	Nil	......	Do. do.
	26	...	Turbid, viscid, yellow.	Do.	1,038	Nil	......	Do. do.
	27	...	Turbid, viscid, orange-yellow.	Do.	1,040	Nil	......	Do. do.
	28	...	Do.	Do.	1,038	Nil	......	Do. do.
	29	...	Turbid, viscid, orange.	Do.	1,040	Nil	......	Do. do.
	30	...	Do.	Do.	1,040	Nil	......	Do. do.
	31	...	Turbid, viscid, yellow.	Do.	1,030	Nil	......	Do. do.
February	1	...	Turbid, viscid, orange.	Do.	1,036	Nil	......	Do. do.
	2	...	Do.	Do.	1,030	Nil	......	Do. do.
	3	...	Turbid, viscid, dark-brown.	Do.	1,038	1/12th	......	Do. do.
	4	...	Turbid, viscid. orange.	Do.	1,034	Nil	......	Do. do.
	5	...	Turbid, yellow	Do,	1,026	Nil	......	Do. do.
	6	...	Turbid, viscid, orange.	Do.	1,036	Nil	......	Do do.
	7	...	Passed but none collected.				......	
	8	...	Passed but none collected.				......	
	9	...	Turbid, viscid, orange.	Alkaline	1,046	Nil	......	Do. do.
	10	...	Do.	Do.	1,036	Nil	......	Do. do.
	11	...	Turbid, orange, yellow.	Do.	1,012	Nil	......	Do. do.
	12	...	Turbid, orange	Do.	1,038	Nil	......	Do. do.
	13	...	Turbid, viscid, orange.	Do.	1,036	Nil	......	Do. do.
	14	...	Passed but none collected.				......	
	15	...	Passed but none collected.				......	
	16	...	No urine passed during the day.				......	
	17	...	Turbid, viscid, orange.	Alkaline	1032	1/35th	......	Do. do.
					Death.			

Australian Gelding —— Age, 7 —— Sex, Gelding —— Colour, Brown

Disease, 'Surra' naturally contracted —— Date of Attack, 30. 10. 92 —— Result, Death —— Date of Result, 17. 2. 93 — Register No. LXXIII

Dates of Observation	Oct. 31	Nov. 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Days of Disease	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Organisms in Blood.	—	—	F	F	N	—	—	—	—	—	—	—	—	—	—	F	N	—	—	—	—	—	N



(S 415)

Hæmatozoon curve ━━━━
Temperature...... ────

Drawn & Litho: Govt. Photozinco: Office Poona 1893

Pulse....... – – – – – – –
Respiration ·················

× Inoculated 3 Guinea Pigs with blood

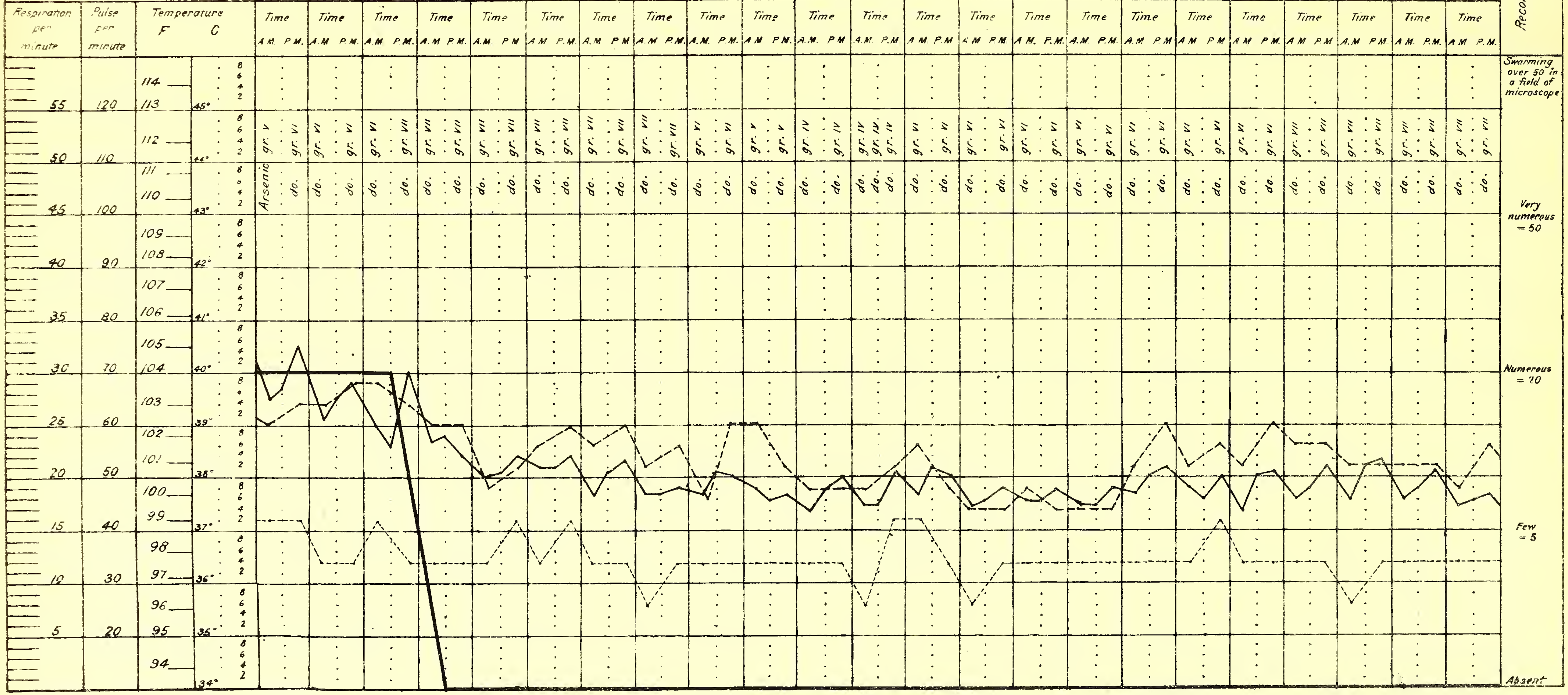
(i) Blood 0·2 c.c. inoculated on 12th November 1892. The hæmatozoon appeared on 29th November 1892. Latent period – 17 days. Death 4 Dec. 1892 Days 22
(ii) " 0·25 c.c. " " " " " 24 " " " 12 " " 25 Feb. 1893 " 105
(iii) " 0·3 c.c. " " " " " 24 " " " 12 " " 12 March 1893 " 120

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age Sex Colour

Disease Date of Result Date of Result Register No. LXXIII

Dates of Observation	Nov. 23	24	25	26	27	28	29	30	Dec. 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Days of Disease	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47
Organisms in Blood	N	N	N	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Time	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.
	gr. v gr. vi	gr. vi gr. vi	gr. vi gr. vii	gr. vii gr. vii	gr. vii gr. vii	gr. vii gr. vii	gr. vii gr. vii	gr. vii gr. vii	gr. vi gr. vi	gr. v gr. v	gr. iv gr. iv	gr. iv gr. iv gr. iv	gr. vi gr. vi	gr. vi gr. vi	gr. vi gr. vi	gr. vi gr. vi	gr. vi gr. vi	gr. vi gr. vi	gr. vi gr. vi	gr. vii gr. vii	gr. vii gr. vii	gr. vii gr. vii	gr. vii gr. vii
	Arsenic do.	do. do.	do. do.	do. do.	do. do.	do. do.	do. do.	do. do.	do. do.	do. do.	do. do.	do. do. do.	do. do.	do. do.	do. do.	do. do.	do. do.	do. do.	do. do.	do. do.	do. do.	do. do.	do. do.



(S 415)

Hæmatozoon curve
Temperature

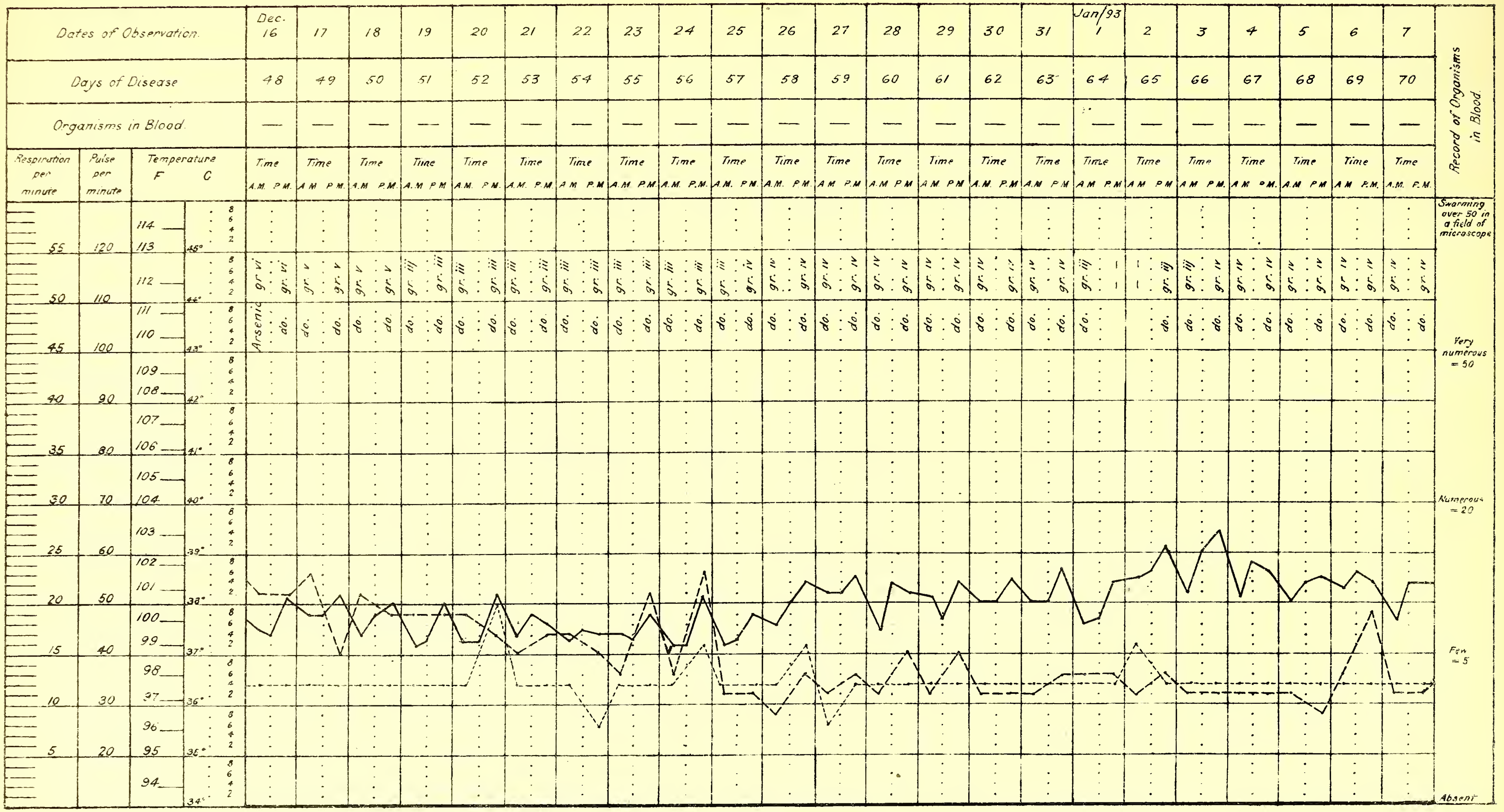
Drawn & Litho: Govt Photozinco: Office Poona 1893

Pulse.... ....
Respiration..........

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age ______ Sex ______ Colour ______

Disease ______ Date of ______ Result ______ Date of Result ______ Register No. LXXHI



(S 415)

Hæmatozoon curve
Temperature ......

Drawn & Litho: Govt. Photozinco: Office Poona 1893

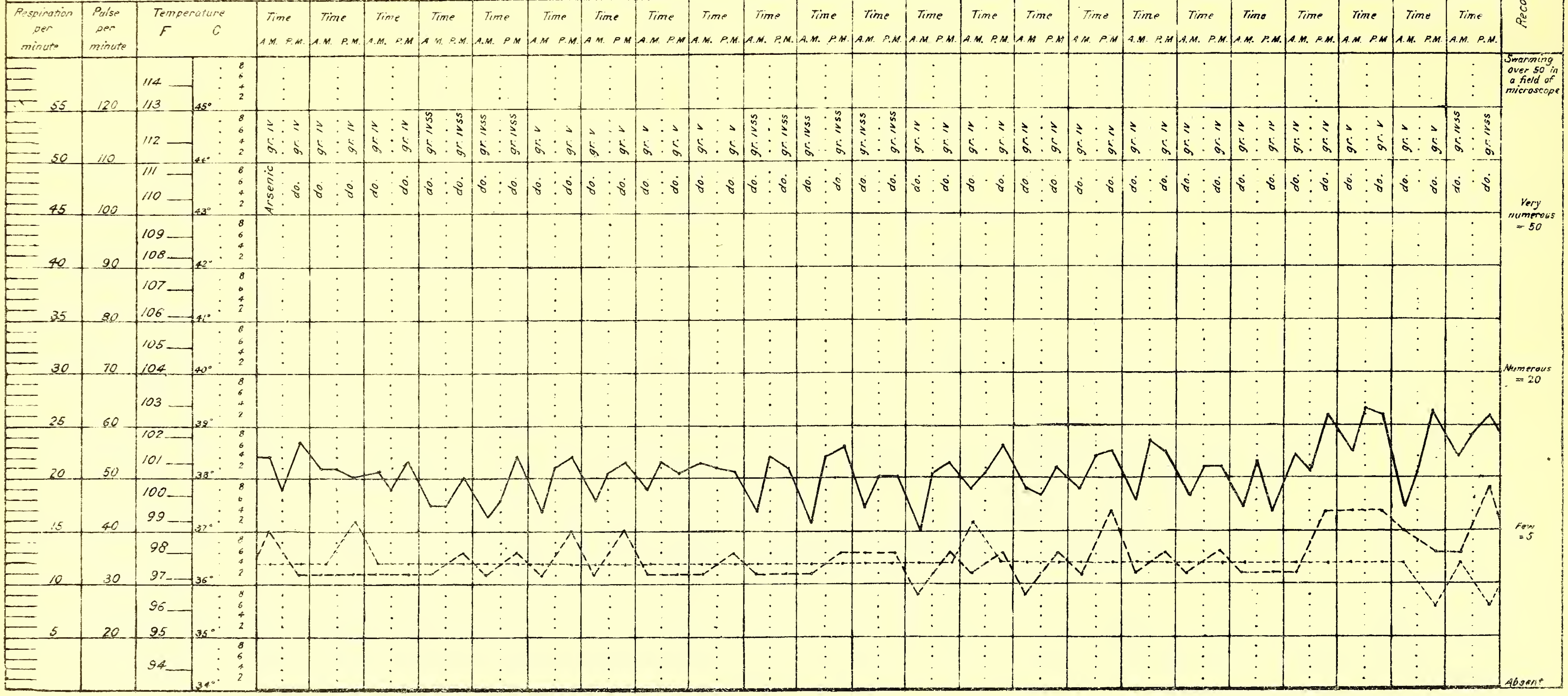
Pulse.........
Respiration..........

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age ______ Sex ______ Colour ______

Disease ______ Date of ______ Result ______ Date of Result ______ Register No. LXXIII

Dates of Observation.	Jan. 8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Days of Disease	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93
Organisms in Blood	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Time A.M.	gr. IV Arsenic	gr. IV do.	gr. IV do.	gr. IVSS do.	gr. IVSS do.	gr. V do.	gr. V do.	gr. V do.	gr. V do.	gr. IVSS do.	gr. IVSS do.	gr. IVSS do.	gr. IV do.	gr. IV do.	gr. IV do.	gr. IV do.	gr. IV do.	gr. IV do.	gr. IV do.	gr. IV do.	gr. V do.	gr. V do.	gr. IVSS do.
Time P.M.	gr. IV do.	gr. IV do.	gr. IV do.	gr. IVSS do.	gr. IVSS do.	gr. V do.	gr. V do.	gr. V do.	gr. V do.	gr. IVSS do.	gr. IVSS do.	gr. IVSS do.	gr. IV do.	gr. IV do.	gr. IV do.	gr. IV do.	gr. IV do.	gr. IV do.	gr. IV do.	gr. IV do.	gr. V do.	gr. V do.	gr. IVSS do.



(S. 415)

Hæmatozoon curve ————
Temperature .... ————

Drawn & Litho: Gov^t Photozinco: Office Poona 1893

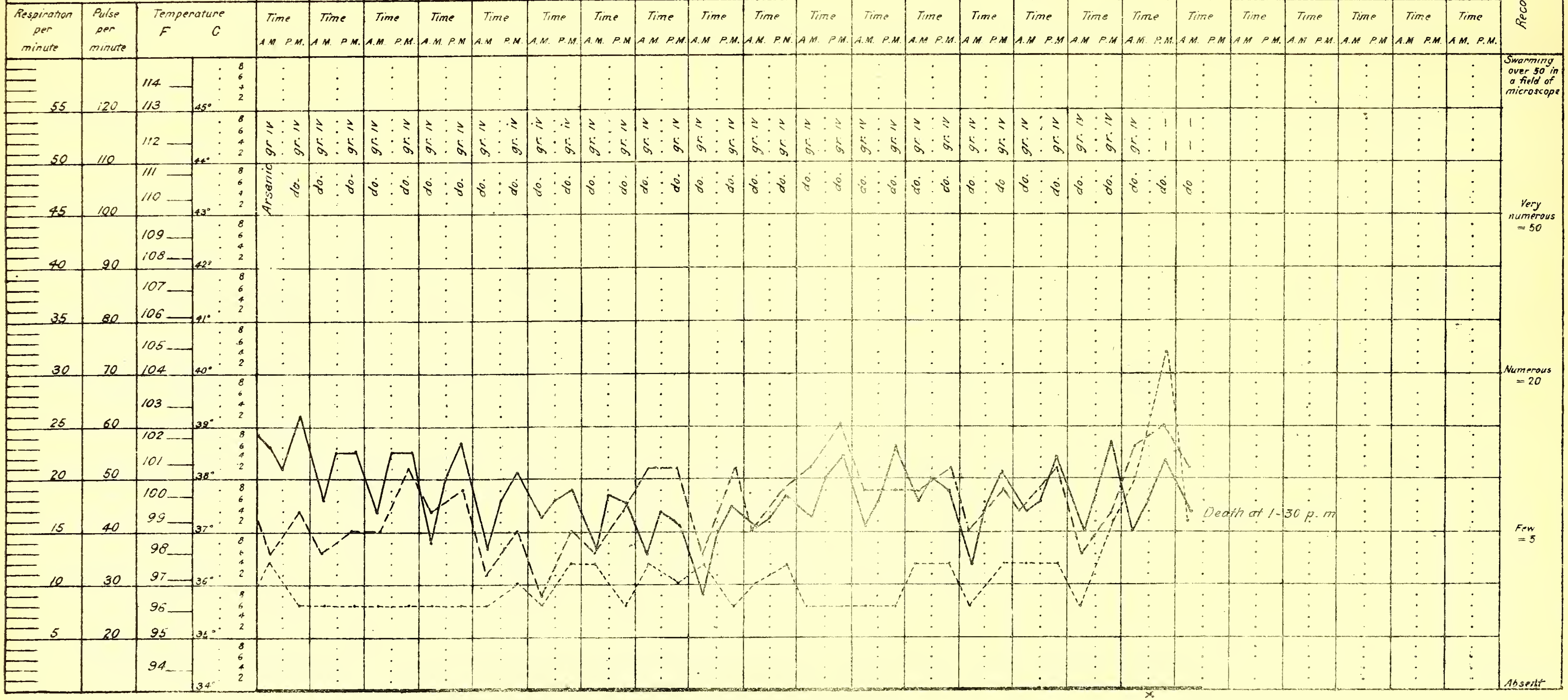
Pulse .... — — — — —
Respiration - - - - - - - - -

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age Sex Colour

Disease Date of Result Date of Result Register No. LXXIII

Dates of Observation.	Jan. 31	Feb. 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17					
Days of Disease	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111					
Organisms in Blood.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—					



(S 415)

Hæmatozoon curve
Temperature

Drawn & Litho. Govt. Photozinco Office Poona 1893

Pulse
Respiration

X Inoculated two Guinea Pigs. } 16.2.93. (I) Blood 0·5 c.c. (II) " 0·5 c.c. } Hæmatozoon absent.

CASE NO. LXXIV.—GREY ARAB GELDING.—*No. 462 of Bombay Tramway Company (Parel Stables 1st Horse 1892). This animal was purchased in 1888.*

On 14*th* October 1892, it was taken into the Infirmary suffering from debility and remained there until November 7th, when the Surra hæmatozoon was discovered.

October 26th	104°F.	= 40°C.	
,, 27th	105·5°F.	= 40·8°C.	
,, 28th	102°F.	= 38·8°C.	
,, 29th	101·5°F.	= 38·5°C.	
,, 30th	101°F.	= 38·3°C.	
,, 31st	100·2°F.	= 37·8°C.	
November 1st	99·5°F.	= 37·5°C.	
,, 2nd	99°F.	= 37·2°C.	
,, 3rd	99°F.	= 37·2°C.	
,, 4th	99°F.	= 37·2°C.	
,, 5th	99°F.	= 37·2°C.	
,, 6th	99°F.	= 37·2°C.	
,, 7th	103°F.	= 39·4°C.	Hæmatozoon present.

Received at the Laboratory at 8 A.M. on November 9th 1892.

State on admission.—The animal is in good condition, bright and lively, the conjunctival membranes are tinged yellow in colour, but there are no petechiæ on the conjunctivæ.

The mucous membrane of the mouth is yellow in colour and pasty; the skin is cool and the extremities fine. Temp. A.M. 38·1°C. P. 36. R. 28. There are a few hæmatozoa in the blood, but the red corpuscles form rouleaux and the white are not increased in number. Temp. 1 P.M. 37·8°C. Urine, turbid, viscid, yellow in colour; Sp. Gr. 1,032, alkaline and contains a slight trace of albumen. Temp. 5 P.M. 38°C. P. 40. R. 28.

10*th*.—The condition of the animal is unchanged. Temp. A.M. 37°C. P. 40. R. 12. There are a few hæmatozoa in the blood. Temp. 1 P.M. 38·1°C. Urine, turbid, viscid, the consistency of white of egg, orange in colour, Sp. Gr. 1,042, alkaline and contains no albumen but crystals of Carbonate and Oxalate of Calcium. Thirty grains of Santonin were administered mixed with the evening feed, which he took readily. Temp. 38·5°C. P. 40. R. 28.

11*th*.—Last night there was a cold wind but the minimum temperature registered was only 14°C. This morning, however, the animal has a slight cough; the visible mucous membranes are yellow and there are several small extravasations on the right conjunctiva. The pulse is full, more frequent than last evening and is quick and not easily compressible. There is no swelling or œdema of the extremities or the under-surface of the abdomen. The fæces appear normal in character. Temp. A.M. 40·3°C. P. 64. R. 24. The hæmatozoa are very numerous in the blood. Temp. 1 P.M. 40·6°C. Urine, turbid, viscid, orange, Sp. Gr. 1,032, alkaline and contains albumen a trace. Thirty grains of Santonin were administered mixed with the evening feed. Temp. 5 P.M. 41°C. P. 64. R. 24.

12*th*.—This morning at 6 A.M. the animal received Oleum Lini, Oj, which moved the bowels three times up to twelve o'clock at noon. The animal appears dull and uneasy evidently from the irritant effect produced by the oil. The visible mucous membranes are stained a bright yellow colour, as also the muco-purulent discharge from the right nostril. There are several extensive extravasations on the conjunctival membranes. The pulse is frequent, but regular, the vessel feels full during the impulse and there is very little alteration in its condition between the beats; the access is somewhat sudden and its duration short, the vessel is not easily compressible. The appetite is fairly good and the fæces normal in character. Temp. A.M. 39·6°C. P. 60. R. 20. The hæmatozoa are numerous in the blood. The red corpuscles are grouped together in masses varying in size, but the individual corpuscles cannot in many instances be made out. The blood taken as a whole has a light-yellow colour, but the white corpuscles, which are slightly increased in number, do not take the yellow colour which in the former case may be due to the two thirty-grain doses of Santonin. Temp. 1 P.M. 39·4°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,024, alkaline, contains albumen 1/8th and a few crystals of Carbonate and Oxalate of Lime. Temp. 5 P.M. 40·3°C. P. 60. R. 28.

13*th*.—The animal looks bright this morning but occasionally coughs and appears to have lost flesh during the past few days; the discharge from the nostril persists. The visible mucous membranes are not so yellow in colour as they were. The pulse is frequent, the vessel feels like a cord under the fingers, the beat is quick, but is followed by persistent fulness of the vessel. The fæces are semi-fluid, but no ascarides have been passed. Temp. A.M. 38·7°C. P. 48. R. 12. The hæmatozoa are numerous in the blood. Temp. 1 P.M. 37·6°C. Urine, turbid, exceedingly viscid, orange in colour, Sp. Gr. 1,030, acid, contains albumen 1/37th, a few Carbonate of Calcium crystals. Temp. 5 P.M. 38·6°C. P. 44. R. 20.

14*th*.—The bowels continue to be loose this morning, and the animal appears dull, but the appetite for hay continues good. The pulse is softer and less frequent but the vessel maintains its full character. Temp. A.M. 38·6°C. P. 44. R. 24. The hæmatozoa are numerous in the blood. Temp. 1 P.M. 38·5°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,032, alkaline, contains albumen 1/38th, crystals of Carbonate and Oxalate of Calcium. As the diarrhœa became more marked, Tinct. Opii ℥iss in water was administered. Temp.5 P.M. 40·8°C. P. 68. R. 20.

15*th.*—The looseness of the bowels was stopped by the opium and this morning the animal appears considerably brighter. The visible mucous membranes still retain the peculiarly ashy colour, but there are no fresh petechiæ on the conjunctivæ. The evacuations are normal in character. Temp. A. M. 39·8°C. P. 48. R. 20. The hæmatozoa are very numerous in the blood. Temp. 1 P.M. 39·7°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,026, neutral in re-action, albumen 1/8th, contains no casts but Carbonate and Oxalate of Calcium crystals. Three drachms of Quinine were administered this evening. Temp. 5 P.M. 40·1°C. P. 64. R. 12.

16*th.*—The animal appears bright and lively, the temperature which was elevated last night is now 39·3°C. The pulse is frequent and full, 64, but the rise of the beat is now gradual, with a somewhat rapid decline and followed by persistent fulness of the vessel. Respirations 24 per minute. There are no fresh petechiæ on the conjunctivæ but the membranes retain their dirty-yellow colour. The appetite is very good and the evacuations are healthy in character. Temp. 1 P.M. 39·1°C. Urine, clear, viscid, orange in colour, Sp. Gr. 1,020, acid, contains 1/28th albumen with crystals of Carbonate and Oxalate of Calcium. The animal received two doses of medicine during the twenty-four hours. Temp. 5 P.M. 39·2°C. P. 52. R. 32.

17*th.*—The general condition of the animal is unchanged, the visible mucous membranes are cleaner than they were, are losing the yellow tinge, but there are several fresh petechiæ on the membrana nictitans of each eye. The pulse is full and strong. The beat is quick and abrupt and the decline rapid; but the vessel is easily compressible. Temp. A.M. 38·5°C. P. 52. R. 16. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·4°C. Urine, turbid, viscid, orange, Sp. Gr. 1,036, alkaline, albumen 1/20th.

Two doses of the medicine were administered during the twenty-four hours, the latter dose of gr. vi had Quinæ Sulph. ʒi added.

Temp. 5 P.M. 39·7°C. P. 64. R. 20.

18*th.*—The animal looks bright and lively, the visible mucous membranes are clean and have lost all trace of the yellow tinge and the petechiæ are fading; but the membranes are pale and bloodless. The pulse has lost much of its force and the beat is much weaker this morning. There is slight œdema of the scrotum. Temp. A.M. 37·7°C. P. 52. R. 16. The hæmatozoon is absent from the blood, the red corpuscles form healthy rouleaux and the white are not increased in number. Temp. 1 P.M. 38·4°C. Urine, turbid, viscid, like white of egg, orange, Sp. Gr. 1,034, alkaline, contains albumen 1/13th numerous granular casts, crystals of Carbonate and Oxalate of Calcium. Two doses of the medicine were administered during the twenty-four hours. Temp. 5 P.M. 37·7°C. P. 64. R. 28.

19*th.*—The condition of the animal is unchanged. Temp. A.M. 39·2°C. P 64. R. 12. The hæmatozoon has again made its appearance in the blood, but only one was discovered in two coverglass specimens. Temp. 1 P.M. 39·3°C. Urine, turbid, viscid, as thick as white of egg, yellow in colour, Sp. Gr. 1,042, alkaline, contains albumen 1/9th, numerous granular casts, together with crystals of Carbonate and Oxalate of Calcium.

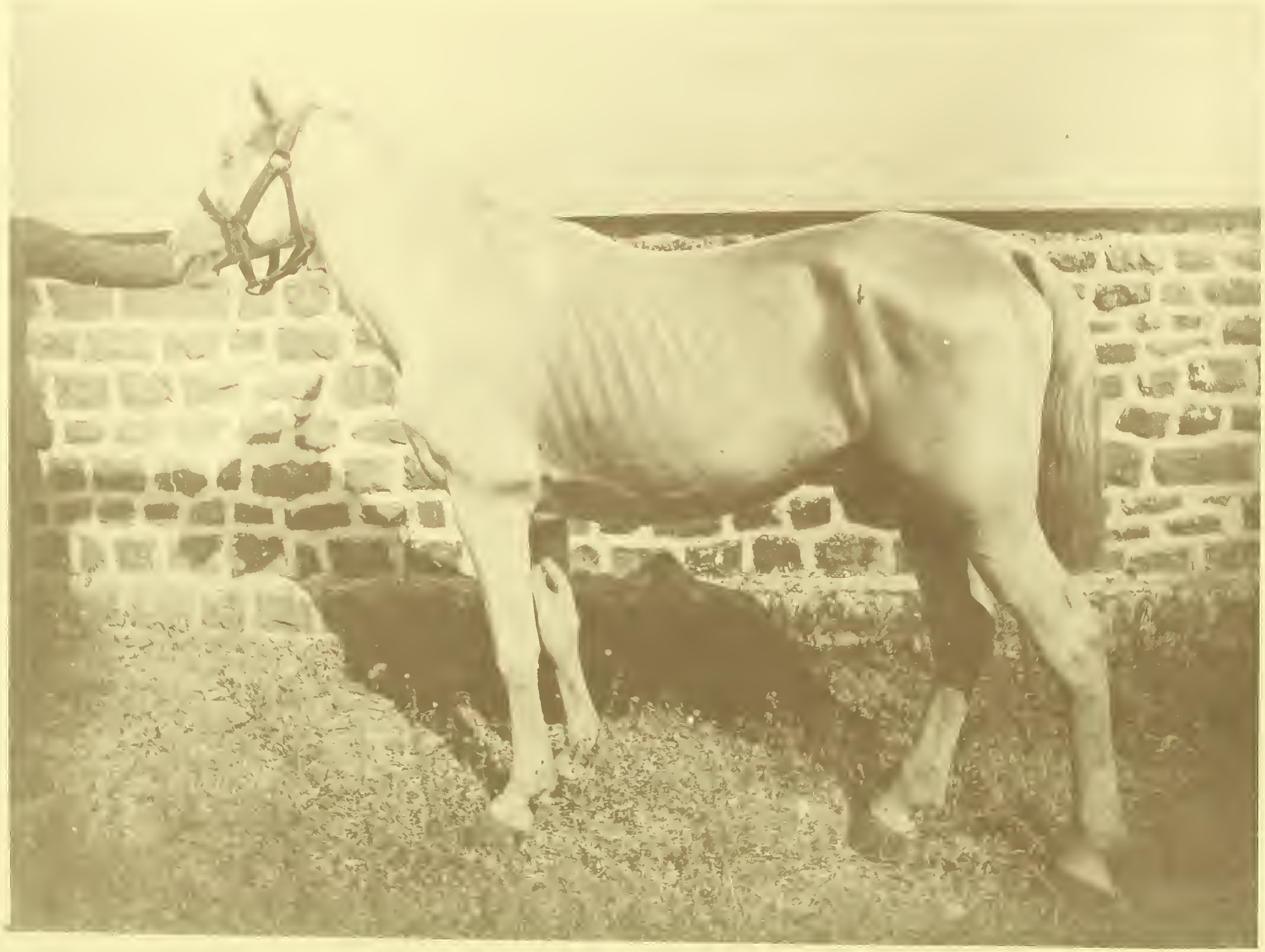
The animal received two doses of the medicine during the twenty-four hours.

Temp. 5 P.M. 39·8°C. P. 64. R. 16.

20*th.*—There is a slight discharge muco-purulent in character from both nostrils, due to cold. Most animals have been suffering from catarrh owing to the night temperature having fallen somewhat suddenly to 15°C; otherwise the animals's condition is unchanged. Temp. A.M. 39·6°C. P. 60. R. 12. The hæmatozoon is present in very small numbers in the blood; only two were found in two coverglass specimens of blood. Temp. 1 P.M. 39·3°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,032, alkaline, contains numerous granular and blood casts and few crystals of Carbonate and Oxalate of Calcium.

Two doses of medicine were administered during the twenty-four hours. The former Iodic Hydrarg gr. vi and in the evening Quinæ Sulph ʒiij. Temp. 5 P.M. 39°C. P. 64. R. 16.

21*st.*—The muco-purulent discharge from the nose has increased in amount, and there is a peculiar sound caused by the entrance of air through the nasal passages, due to the swollen condition of the mucous membrane lining those cavities. The visible mucous membranes are clean and devoid of petechiæ, but they present an exceedingly pallid and anæmic appearance. The appetite is good and the evacuations are normal in character. Temp. A.M. 39°C. P. 60. R. 12. The hæmatozoa are numerous in the blood. Temp. 1 P.M. 39·3°C. Urine, turbid, viscid greenish-yellow in colour, Sp. Gr. 1,026, alkaline, and contains albumen, blood and granular casts, crystals of Carbonate and Oxalate of Calcium.



HORSE NO. LXXIV.

PHOTOGRAPHED ON NOVEMBER 23RD 1892. THE 17TH DAY OF THE DISEASE.

Two doses of medicine were administered during the twenty-four hours. Iodic Hydrarg gr. vi in the morning and Quinæ Sulph ʒiij in the evening. Temp. 5 P.M. 40·3°C. P. 64. R. 16.

22nd.—The condition of the animal is unchanged. Temp. A.M. 40·3°C. P. 72. R. 12. The hæmatozoa are numerous in the blood. Temp. 1 P.M. 40°C. Urine, turbid, viscid orange, Sp. Gr. 1,020, alkaline, contains albumen 1/3rd, crystals of Carbonate and Oxalate of Calcium. Two doses of Arsenic each gr. v in the form of Liq. Arsenicalis were administered in water during the twenty-four hours. Temp. 5 P.M. 40·8°C. P. 76. R. 16.

23rd.—The animal appears brighter and has improved somewhat in appearance since yesterday, but there is no amelioration in the symptoms. The muco-purulent discharge from the nostrils is reduced in quantity and the breathing through the nasal passages is freer, but the visible mucous membranes continue to be tinged yellow and there are several fresh petechiæ of a claret colour invading the membranæ nictitantes. The pulse is strong and regular, but there is an increase in tension. The œdema is spreading forwards along the under-surface of the abdomen, but the hind-fetlocks are only slightly increased in size. The appetite is very good and the evacuations are healthy in character. Temp A.M. 39·4°C. P. 52. R. 16. The hæmatozoon is absent from the blood. Temp. 1 P.M. 39·1°C. Urine, turbid, viscid, dark-brown in colour, Sp. Gr. 1,018, alkaline, albumen 1/4th together with a heavy precipitate of phosphates, and some granular casts and pus cells. Two doses of the Liq. Arsenicalis were given during the day, gr. xii of Arsenic. Temp. 5 P.M. 39·1°C. P. 52. R 20.

24th.—This morning the animal was found in the recumbent position and unable, without assistance, to gain the upright, so was placed in slings. The visible mucous membranes are tinged yellow, and the petechiæ maintain their dark colour. The pulse is regular, but the beat quick and abrupt, the tension being considerably increased, the vessel feeling like a thick cord under the finger. There was slight prolapse of the gut after straining, but became reduced naturally a little later. The fæces are somewhat hard but appear otherwise normal in character. Temp. A.M. 37·3°C. P. 52. R. 16. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·7°C. No urine. Two doses of the medicine were administered during the twenty-four hours. Temp. 5 P.M. 38·1°C. P. 48. R. 16.

25th.—The animal is able to stand without the support of the slings, but the general condition of it is unchanged, with this exception that the œdema of the sheath is less and there has been no further prolapse of the rectum. A slight hæmorrhage took place from the right nostril during the night, evidenced by the dried blood round that orifice this morning. The appetite is excellent, the animal stands eating the whole day. Temp. A.M. 36·5°C. P. 52. R. 12 The hæmatozoon is absent from the blood. Temp. 1 P.M. 39·4°C. Urine, turbid, viscid, dark greenish-brown. Sp. Gr. 1,024, alkaline, contains albumen 1/9th, blood and granular casts with crystals of Carbonate and Oxalate of Calcium. Two doses of Arsenic gr. vi. in each were administered during the twenty- four hours. Temp. 5 P.M. 37·8°C. P. 48. R. 20.

26th. The condition of the animal is the same as yesterday, with the exception that the œdema has appeared between the fore-limbs. Temp. A.M. 37.4°C. P. 48. R. 16. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,026, alkaline, contains albumen 1/11th, together with blood and granular casts. Two doses of Arsenic gr. xii in all were administered during the twenty-four hours. Temp. 5 P.M. 37·6°C. P. 52. R. 20.

27th.—The condition of the animal is unchanged. Temp. A.M. 37·7°C. P. 44. R. 16. The hæmatozoa are few in the blood. Temp. 1 P.M. 37·4°C. Urine, turbid, viscid, yellowish-green, Sp. Gr. 1024, alkaline, contains albumen 1/20th, a trace of phosphates, granular casts, Carbonate of Calcium crystals. Two doses of the medicine were administered during the twenty-four hours. Temp. 5 P.M. 38°C. P. 52. R. 12.

28th.—The general condition of the animal is unchanged. Temp. A.M. 37·3°C. P. 44. R. 16. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38°C. Urine, turbid, viscid, greenish yellow, Sp. Gr 1,016, alkaline, contains no albumen, but granular casts and Carbonate crystals. Temp. 5 P.M. 38·5°C. P. 64. R. 12. Twelve grains of Arsenic were administered during the twenty-four hours.

29th.—The animal is losing flesh but is stronger than on the 26th instant. The visible mucous membranes are much cleaner and there is a total absence of petechiæ on the conjunctivæ. The hind extremities are the seat of considerable swelling and œdema, but the œdema on the under-surface of the abdomen is considerably reduced in amount. The appetite appears to be in excess of normal. Temp. A.M. 36·5°C. P. 44. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·8°C. The urine is turbid, viscid, yellowish-green in colour, Sp. Gr. 1,018, alkaline and contains albumen 1/23rd, granular casts, Carbonates and Oxalates.

Two doses of the medicine were administered during the twenty-four hours. Temp. 5 P. M. 37·7°C. P. 52. R. 12.

30th.—The condition of the animal is unchanged. Temp. A.M 37·5°C. P. 64. R 12 The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·2°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1040, alkaline, contains no albumen, but granular casts, Carbonate and Oxalate crystals, and gives the re-action for bile pigment and bile acids.

Two doses of the medicine were administered during the twenty-four hours.

Temp. 5 P.M. 38·2°C. P. 56. R. 16.

1st December.—The condition of the animal is unchanged. There is one fresh ecchymosis on the left conjunctiva, the pulse is frequent and forcible and the wave abrupt, not easily compressible. The appetite remains excellent. The fæces however continue to emit a very foul odour. Temp. A.M. 37·2°C. P. 48. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·6°C. Urine, turbid, viscid, green in colour, Sp. Gr. 1,024, alkaline, contains albumen, bile pigment and slight trace of bile acid. The animal received two doses of the medicine during the twenty-four hours. Temp. 5 P.M. 38·4°C. P. 64. R. 20.

2nd.—This morning there are five or six petechiæ invading the right conjunctiva, otherwise the condition of the animal is unchanged. Temp. A.M. 37·5°C. P. 60. R. 16. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·6°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,048, alkaline, contains no albumen.

Two doses of the Arsenic, gr. xii in all, were given during the twenty-four hours. Temp. 5 P.M. 38·4°C. P. 68. R. 16.

3rd.—The condition of the animal is unchanged. Temp. A.M. 37·7°C. P. 52. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·3°C. Urine, turbid, viscid, green in colour, Sp. Gr. 1,030, alkaline, contains albumen 1/8th, blood and granular casts, slight trace of bile and bile acids, together with Carbonate of Calcium crystals. Two doses of Arsenic, gr. xii in all, were administered during the twenty-four hours. Temp. 5 P.M. 38·4°C. P. 60. R. 16.

4th.—The condition of the animal is unchanged. Temp. A.M. 37·6°C. P. 48. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·2°C. Urine, turbid, viscid, green in colour, Sp. Gr. 1,034, alkaline, contains albumen 1/9th, blood and granular casts, together with a trace of bile and bile acids, and Carbonate of Calcium. Two doses of Arsenic, gr. xii in all, were administered during the twenty-four hours. Temp. 5 P.M. 37·8°C. P. 56. R. 12.

5th.—The condition of the animal is unchanged. Temp. A.M. 36·7°C. P. 44. R. 12. The hæmatozoon is absent from blood. Temp. 1 P.M. 38·1°C. Urine, turbid, viscid, yellowish green in colour, Sp. Gr. 1,024, alkaline, contains no albumen. Twelve grains of Arsenic were administered during the twenty-four hours. Temp. 5 P.M. 38°C. P. 48. R. 12.

6th.—The condition of the animal is unchanged. Temp. A.M. 36·8°C. P. 40. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·6°C. Urine, turbid, yellowish-green in colour, Sp. Gr. 1,028, alkaline, contains no albumen. Twelve grains of Arsenic were administered during the twenty-four hours. Temp. 5 P.M. 38·1°C. P. 48. R. 12.

7th.—The animal continues to lose flesh but at the present time the œdema of the sheath and abdomen has quite disappeared although the extremities continue swollen. Temp. A.M. 37°C. P. 44. R. 12. Hæmatozoon absent. Temp. 1 P.M. 38·2°C. Urine, turbid, viscid, green in colour, Sp. Gr. 1024, alkaline, contains no albumen.

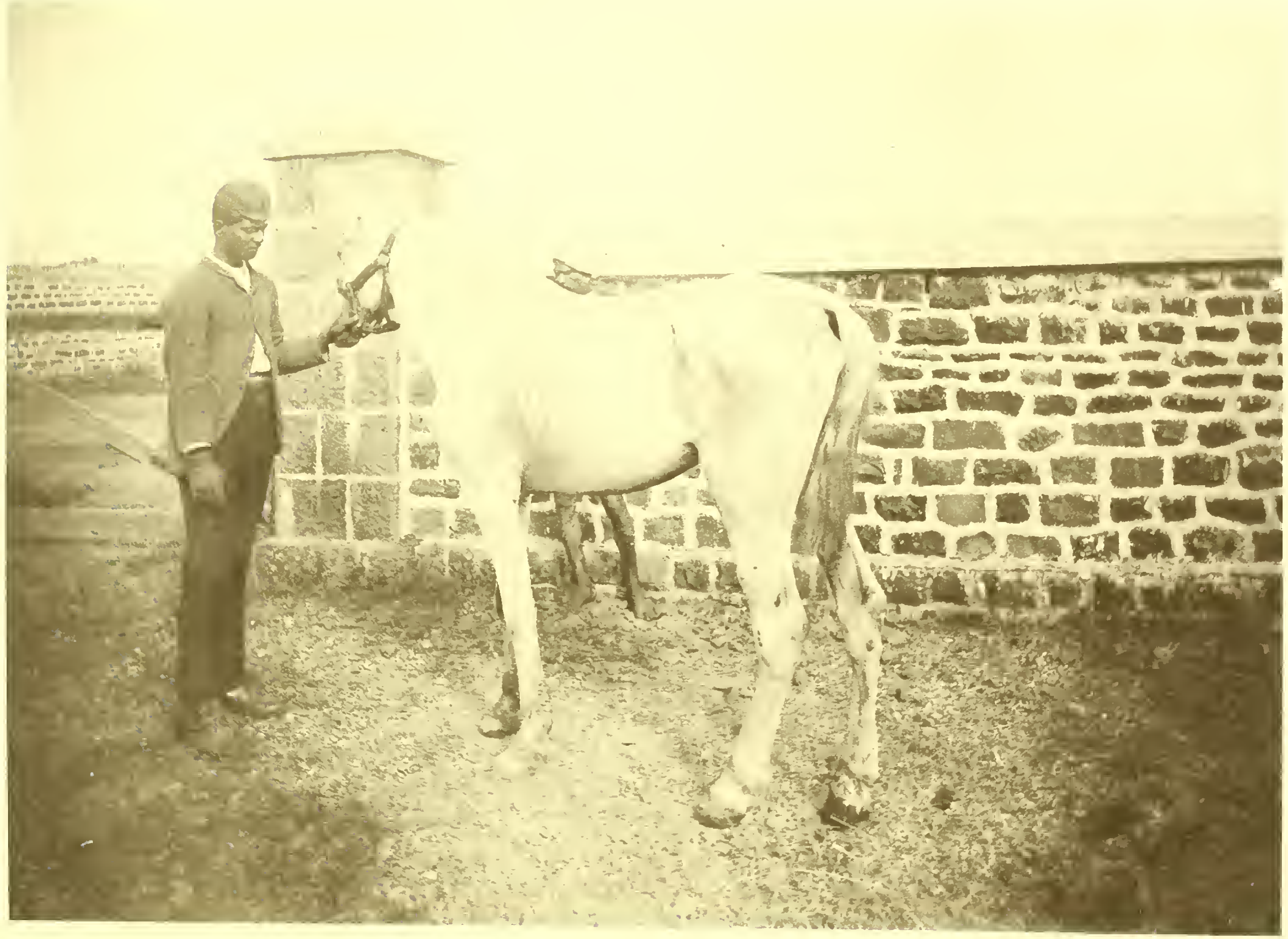
Two doses of Arsenic, gr. xii in all, were given during the twenty-four hours. Temp. 5 P.M. 38·1°C. P. 44. R. 12.

8th.—The condition of the animal is unchanged. Temp. A.M. 37·1°C. P. 44. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·3°C. Urine, turbid, viscid, yellowish green in colour, Sp. Gr. 1,028, alkaline, contains no albumen, crystals of Carbonate and Oxalate of Calcium. Twelve grains of Arsenic were administered during the twenty-four hours. Temp. 5 P.M. 38°C. P. 32. R. 16.

9th.—The general condition of the animal has improved. The pulse-beat is however forcible and dicrotic with high tension. There are no petechiæ on the conjunctivæ, the œdema of the extremities is reduced in amount and the fetid condition of the breath and the offensive odour from the dung have completely disappeared. Temp. A.M. 37·3°C. P. 44. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·4°C. Urine, turbid, viscid, greenish-yellow in colour, Sp. Gr. 1,022, alkaline, contains no albumen.

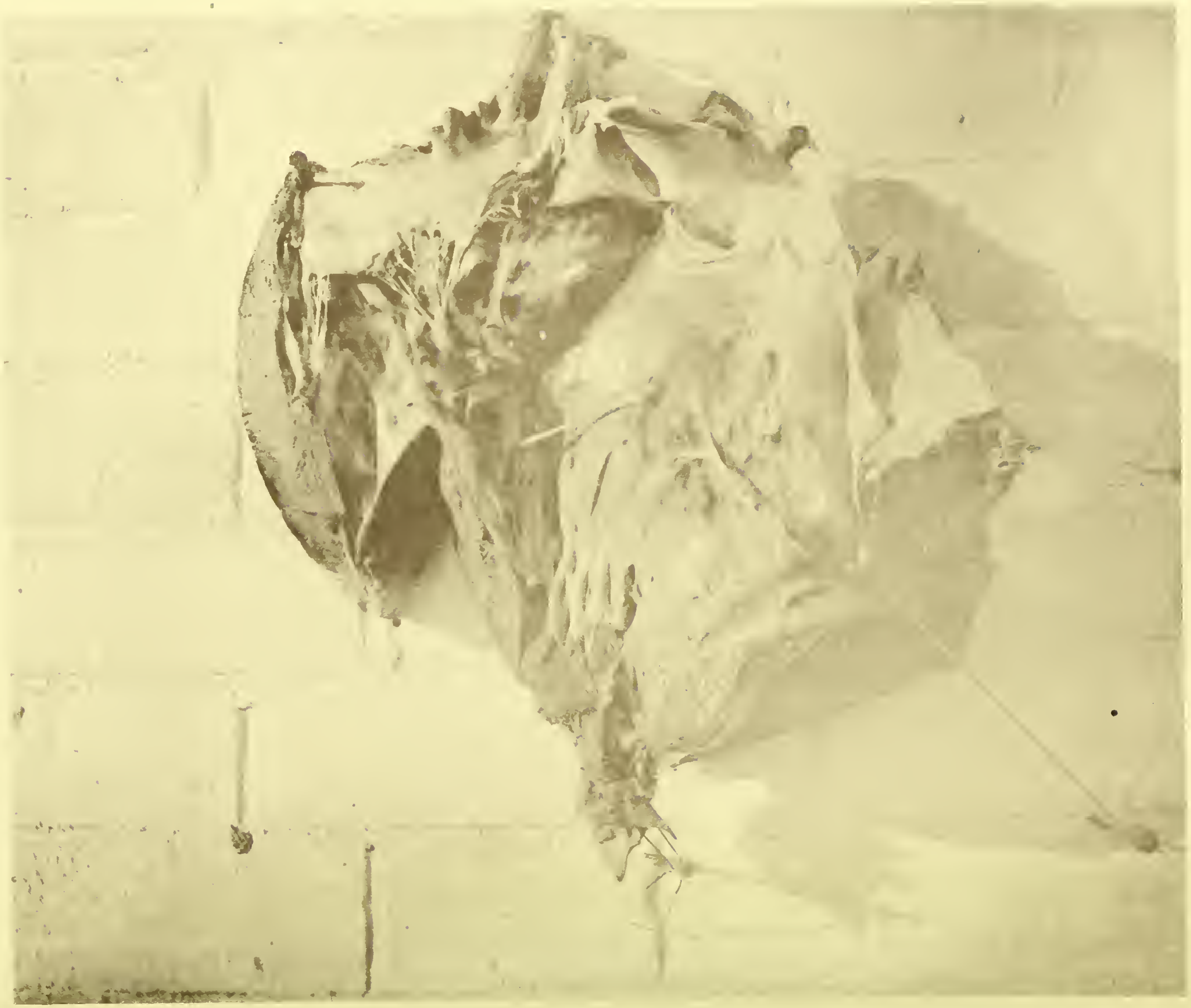
Twelve grains of Arsenic were administered during the twenty-four hours. Temp. 5 P.M. 38·5°C. P. 48. R. 12.

10th.—The condition of the animal is unchanged. Temp. A.M. 36·6°C. P. 48. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·6°C· Urine, turbid, viscid,



HORSE NO. LXXIV.

PHOTOGRAPHED ON THE 9TH DECEMBER 1892 TO SHEW THE CONDITION OF THE ANIMAL ON THE 33RD DAY OF THE DISEASE.



HORSE NO. LXXIV:

INTERNAL SURFACE OF THE LEFT VENTRICLE OF THE HEART, SHEWING EXTENSIVE SUB-ENDOCARDIAL EXTRAVASATIONS OF BLOOD greenish-yellow in colour, Sp. Gr. 1,040, alkaline, contains no albumen. Twelve grains of Arsenic were given during the day. Temp. 5 P.M. 39·3°C. P. 56. R. 12.

11*th*.—The animal is losing flesh very rapidly, but still appears to be fairly strong. The appetite is and has been exceedingly good since the first. There is no swelling or œdema on the under-surface of the belly or sheath and the limbs are fine. The fœtor of the breath, however, has re-appeared, and the fæces emit a foul odour. Temp. A.M. 38°C. P. 48. R. 16. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·7°C. Urine, turbid, viscid, yellowish-green in colour, Sp. Gr. 1,024, alkaline, contains no albumen, but granular casts, no Carbonates, but a few Oxalates. Twelve grains of Arsenic were administered during the twenty-four hours. Temp. 5 P.M. 39·1°C. P. 60. R. 16.

12*th*.—The condition of the animal is unchanged. Temp. A.M. 38·5°C. P. 52. R. 12. The hæmatozoon is absent from blood. Temp. 1 P.M. 38·7°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,020, alkaline, contains no albumen, but a few granular casts and few Oxalates. Twelve grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 39·2°C. P. 60. R. 12.

13*th*.—The condition of the animal is unchanged. Temp. A.M. 37·3°C. P. 48. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·7°C. Urine, turbid, viscid, greenish-yellow in colour, Sp. Gr. 1,020 alkaline, contains a trace of albumen and contains granular casts, a few red blood corpuscles together with Oxalate, but no Carbonate of Calcium crystals. Twelve grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·3°C. P. 56. R. 16.

14*th*.—This morning the animal's temperature is lower than it has been before, although it was nearly as low on the 25th—29th November and 10th December. There is sero-purulent discharge from the nostrils, especially the right, which has a very offensive odour. The appetite, which has been almost voracious for a considerable period, is now not so good and the animal only consumes about half of the previous quantity. Temp. A.M. 36·5°C. P. 44. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·5°C. Urine, turbid, highly viscid, greenish-yellow in colour, Sp. Gr. 1,022, alkaline and contains granular casts, a few red blood corpuscles together with Oxalates but no Carbonates. Twelve grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 39·1°C. P. 68. R. 20.

15*th*.—Death took place at 3 A.M.

AUTOPSY.—Body emaciated, limbs not œdematous, but a little in front of the sternal region.

Thorax.—The pleural cavities each contain from 20 to 30 ounces of an orange fluid.

Right Lung.—The external or costal surface is adherent from the first rib to the eighth and between the visceral and costal pleuræ is a layer of orange-coloured jelly-like exudation varying from ¼ to ½ an inch in thickness. The anterior lobule together with the anterior 6 inches of the summit and the anterior inferior angle of the organ, present a deep red colour and are the seat of consolidation. There are several extensive sub-pleural extravasations on the external surface of the posterior lobe and the internal surface presents a marbled appearance. *On section* the individual lobules of the consolidated portion are found to be mapped out with a thin layer of exudation, and are of a dark red or purple color; on pressure, a muco-purulent material exudes from the cut ends of the bronchi. The posterior portion of the organ is marbled red and white tinged with yellow, but is distended with air.

Left Lung is adherent from the first to the ninth rib inclusive. There is likewise consolidation of the anterior lobule, together with the anterior seven inches of the summit and anterior inferior angle of the organ. The description of the pathological changes in the left lung was identical with those observed in the right.

The pericardial sac contains ten ounces of a turbid, orange-coloured fluid.

Heart weighs 6 lbs. 5 ounces and is enlarged. The base of the organ is the seat of a considerable amount of orange-coloured exudation which extends round the origin of the great vessels and runs down with the anterior and posterior coronary vessels. There are however no sub-pericardial extravasations. On section the right auricle contains dark coloured blood clots but lining membrane presents a healthy appearance. The *right ventricle* is also distended with dark coloured blood clots which when removed, disclose the presence of a few sub-endocardial ecchymoses. The *left auricle* is empty and presents a healthy appearance. The *left ventricle* is somewhat contracted, the muscular wall on section about the centre of the organ is found to measure 2·5 inches in thickness, and to contain a few dark coloured blood clots. The cavity presents a most extraordinary appearance, the upper half being almost black in colour, due to the presence of extensive sub-endocardial extravasations of dark coloured blood. One lying on the inter-ventricular septum measures 3·5″ × 1·5″ × 1″. The summits of both musculi papillares are also the seat of well marked deposits of clot lying beneath the lining membrane of the cavity, but on section of the wall the extravasations do not appear to involve the muscular structures to any extent. There are also numerous ecchymoses dotted over the lower half of the cavity. The abdominal cavity is free from fluid.

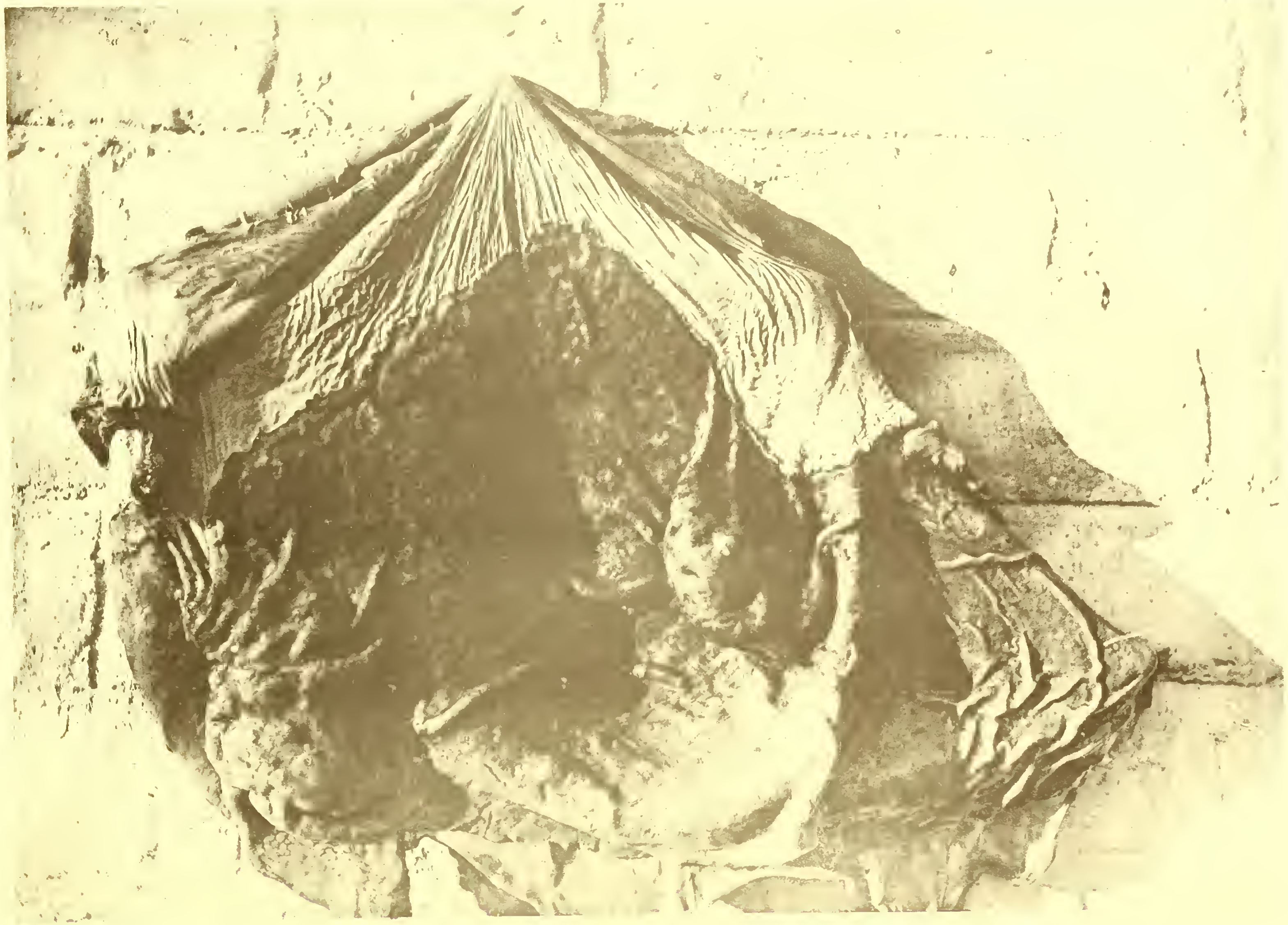
Liver weighs 11 lbs. 14 ounces, is normal in size and presents old signs of perihepatitis together with a few calcareous bodies which are seen invading the structures of the organ.

Spleen weighs 1 lb. 13 ounces, is normal in size. There are no sub-capsular petechiæ visible. The tissues on section are firm and present a healthy appearance. *Kidneys; right* 1 lb. 12 ounces; *left* 2 lbs. 1½ ounces; are considerably enlarged. The capsules strip easily and disclose the presence of numerous injected stellate veins, but there are no petechiæ visible. *On section* the cortical portion of the organs is pale and the medullary of a somewhat purple colour, but no pathological change discernible to the naked eye can be detected. *Stomach* is large and semi-distended. *On section* it is found to contain semi-digested food, and emits a very foul odour. The *cuticular* portion presents a normal appearance; the mucous membrane of the *villous* portion is healthy, but there are two large tumors involving its substance, which are raised considerably above the surrounding mucous membrane, each presenting one or more holes on its summit and sides, which lead into the internal cavities of the masses. One tumor measuring 3" × 2" × 1·75" is situated two inches on the pyloric side of the line of demarcation, occupying almost a median position in the fundus of the right sac. The other measures 3·3" × 2·5" × 1·5" and is situated just above the inferior one, almost midway between the œsophageal opening and the pylorus, on the lesser curvature, and so protruding from the roof of the organ. (*Spiroptera Megastoma*). *The small Intestines* present a perfectly healthy appearance.

The large Intestines.—There is one patch about three inches square in the cæcum where the vessels are congested and present an aborescent appearance, but there is no ulceration.

Rectum.—About two inches from the anal orifice there is an ulcer, oval in shape, with thickened edges, in process of repair, ¾ inches in length by ¼ inch in width, situated upon a raised base; the surface of the ulcer is occupied by a long narrow slough of coagulated pus, and the edges, &c., are free from any inflammatory condition and from any congestion of the vessels. No parasites of any kind. *The bladder.—On section* the cavity of the bladder contains several pints of urine, orange in colour, which has the consistency of semi-solid cold starch, with a Sp. Gr. of 1,028, acid in re-action. The mucous membrane lining the organ, presents a few small, round extravasations of blood, dark in colour. *The nasal fossæ.*—The Schneiderian membrane is somewhat congested and presents a pinkish colour and the vessels of the membrane covering the middle septum of the nose are also congested.

Remarks.—This animal, a Grey Arab Gelding, aged 14 years, belonged to the Bombay Tramway Company, was recognised as ailing on the 14th October 1892, and was removed into the Infirmary. This was the first horse to be seized with "Surra" in the Parel stables during the year, after a residence in Bombay of about four years. Between the latter date and October 26th the maximum temperature recorded was 40·8°C. It then commenced to decline until the morning of November 2nd when it attained a minimum of 37·2°C and continued at that degree until the morning of 6th November. On the 7th November the temperature had again risen and was 39·4°C; at the same time on microscopical examination of the blood, the Surra hæmatozoon was discovered. For the next 48 hours the temperature gradually declined, and on the arrival of the animal at the Laboratory Hospital registered 38·1°C. P. 40. R. 28. On admission the condition of the animal was good. It presented a bright and lively appearance, but on examination the visible mucous membranes were found to be tinged a yellow colour, although the conjunctivæ were free from petechiæ. The skin felt cool, the extremities were fine and there was an absence of œdema from the sheath and under-surface of the abdomen. The blood, on microscopical examination, presented normal rouleaux, although a few hæmatozoa were observed, but the white corpuscles were not increased in number. The urine, however, contained a trace of albumen. On the 10th, there was little or no change except that the respirations fell to 17 per minute and the urine was free from albumen. Consequently it was decided to try the effect of Santonin on the hæmatozoa, and for this purpose grains xxx were administered in the evening mixed with the corn, &c. By the following morning, the animal had a slight cough and the temperature had again become considerably elevated 40·3°C, P. 64, R. 24, and by the evening registered 41°C. The organisms were very numerous in the blood; a similar dose of Santonin was repeated. By the 12th the fever had somewhat abated and the organisms had decreased in number in the blood. Oleum Lini Oj was administered in order to produce a laxative effect and so get rid of Santonin, which had given an intense orange colour to the mucous membranes, and the urine was found to contain $\frac{1}{18}$th of albumen. The temperature rose again the same evening to 40·3°C, P. 60, R. 28, but during the night fell 2·8°C., and in the morning the animal although bright in appearance had visibly lost in condition. There was slight diarrhœa and the hæmatozoa were still numerous in the blood. By the evening of the 14th the temperature had again risen to 40·8°C., P. 76, R. 28, and as the diarrhœa still persisted, Tincture Opii ℥iss was administered. On the 15th, although there was a fall (of a degree) in the temperature, pulse and respirations, the hæmatozoa were very numerous again; consequently Quinæ Sulph. ʒiij was given in order to reduce the temperature temporarily so that a treatment consisting of the



HORSE NO. LXXIV.

INNER SURFACE OF STOMACH, SHEWING TWO SPIROPTERA TUMOURS INVADING THE VILLOUS PORTION OF THE ORGAN.

Double Iodide of Potassium and Mercury (Iodic-Hydrarg) could be commenced. On the morning of the 16th the thermometer registered 39·2°C., and the organism was absent for the first time during a period of ten days. Four grains of the drug were administered, followed by a similar dose in the evening, which had the effect of bringing down the temperature on the morning of the 17th, to 38°5C., with the organisms still absent. On the 19th, although Iodic-Hydrarg grains xxxviii had been given, the hæmatozoon had re-appeared in the blood. The thermometer registered 39·2°C., and 39·8°C. by 5 P.M. This treatment was continued until the 21st with unsatisfactory results, as the temperature was 40·3°C. and the organisms numerous in the blood, So after giving another dose of Quinæ Sulph. ʒiij an Arsenical treatment was substituted for the Iodic-Hydrarg. On the morning of the 22nd, after the administration to the animal of Arsenic grains x, the organism disappeared from the blood, and on the 25th the temperature fell as low as 36·5°C. But on the 27th, the date of a recurrence in the ordinary course of events, the hæmatozoon was again found in small numbers in the blood for one day. Thus only an abortive paroxysm took place, its further course being frustrated by the effect of the Arsenic. From this date until the morning of the 15th December, on which date death took place, a period of seventeen days, the hæmatozoon was absent from the blood. Unfortunately the presence of albumen in the urine from the very first day previous to the treatment being commenced followed at a later date by numerous blood and granular casts, was a very serious symptom and really contra-indicated the treatment adopted, in view of the serious kidney lesion betokened, but as the disease was rapidly progressive, it was necessary to adopt some form of treatment capable of destroying the hæmatozoon as quickly as possible, so that after giving Santonin a trial, Iodic-Hydrarg was employed but with negative results, so that one was forced to fall back upon Arsenic in the form of Liq. Arsenicalis.

RECORDS OF URINE.

Animal, Grey Arab Gelding No. LXXIV. Date, November 9th, 1892.
Disease, Naturally Contracted Surra.

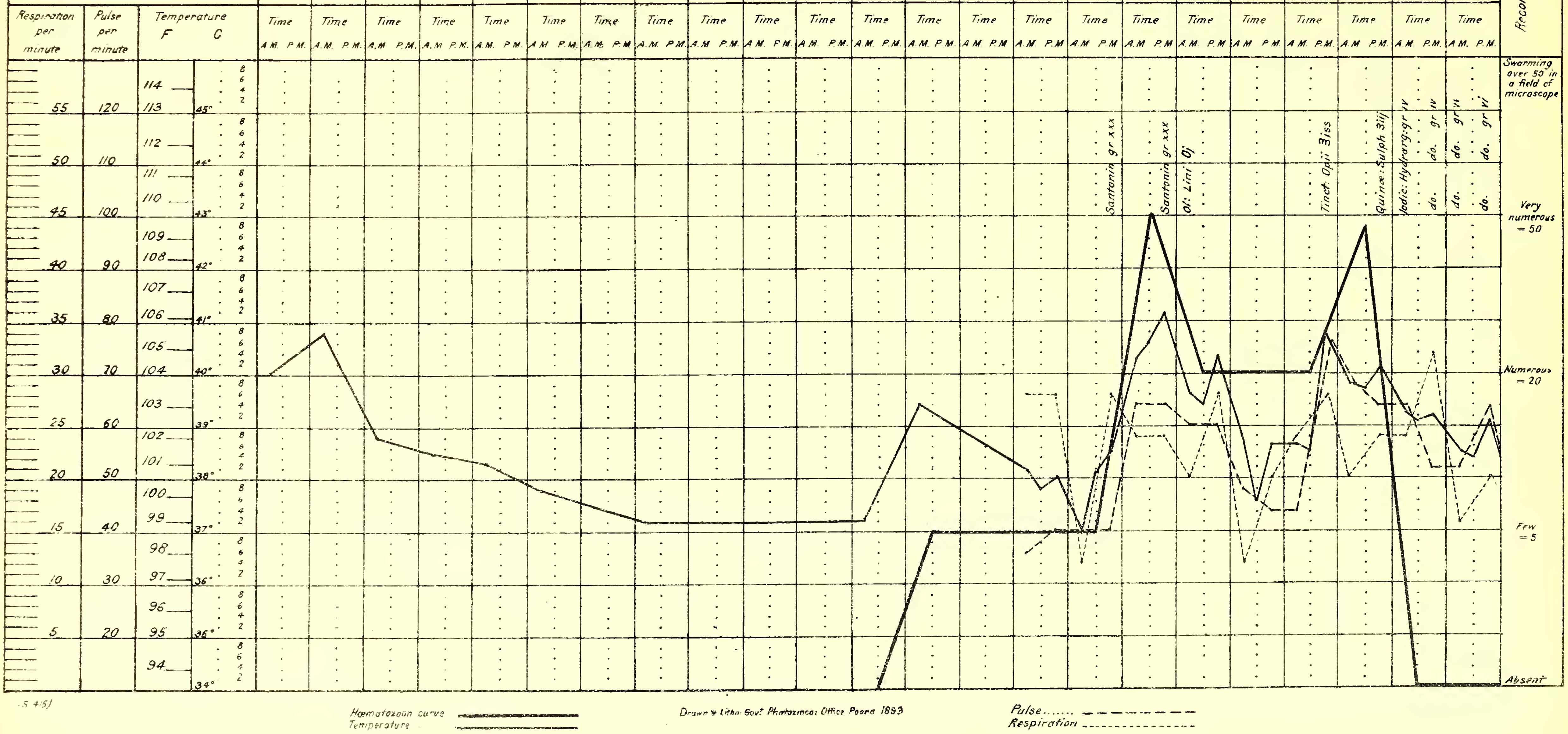
Date.	Quantity.	Colour.	Re-action.	Specific Gravity.	Albumen.	Phosphates.	REMARKS.
1892. November 9th.	..	Viscid, turbid yellow.	Alkaline.	1,032	Faint trace.	Nil.	
„ 10th.	...	Turbid, viscid orange.	Do. ...	1,042	Nil ...	Do. ...	Crystals of Nitrate.
„ 11th.	...	Turbid, viscid bright-yellow.	Do. ...	1,032	A trace...	Do. ...	
„ 12th.	...	Turbid, viscid, orange.	Do. ...	1,024	$\frac{1}{18}$	A trace.	
„ 13th.	...	Turbid, exceedingly viscid.	Acid ...	1,030	$\frac{1}{37}$	Do.	
„ 14th.	...	Turbid, viscid, orange.	Alkaline.	1,032	$\frac{1}{38}$	Do	
„ 15th.	...	Do. ...	Neutral.	1,026	$\frac{1}{8}$	Do.	
„ 16th.	...	Clear, viscid, orange.	Acid ...	1,020	$\frac{1}{28}$	A trace...	Granular casts, few Carbonates, few Oxalates.
„ 17th.	...	Turbid, viscid, orange.	Alkaline.	1,036	$\frac{1}{20}$	Do. ...	Large number of granular casts.
„ 18th.	...	Do. ...	Do. ...	1,024	$\frac{1}{13}$	Do. ...	Do. do.
„ 19th.	...	Turbid, viscid, greenish-yellow	Do. ...	1,042	$\frac{1}{9}$	Do, ...	Do. do.
„ 20th.	...	Turbid, viscid, orange.	Do. ...	1,032	$\frac{1}{22}$	Do. ...	Do. do.
„ 21st.	...	Turbid, viscid, greenish-yellow.	Do. ...	1,026	$\frac{1}{7}$	Do.	
„ 22nd.	...	Turbid, viscid, orange.	Do. ...	1,020	$\frac{1}{3}$	Do.	
„ 23rd.	...	Turbid, viscid, dark-brown.	Do. ...	1,018	$\frac{1}{4}$	Heavy precipitate.	
„ 25th.	...	Turbid, viscid, greenish-brown.	Do. ...	1,024	$\frac{1}{9}$	Nil ...	Blood and granular casts, Carbonates and Oxalates.
„ 26th.	...	Turbid, viscid, greenish orange.	Do. ...	1,026	$\frac{1}{11}$	Do. ...	Granular casts and no Oxalates.
„ 27th.	...	Turbid, viscid, pea-soup.	Do- ...	1,024	$\frac{1}{20}$	A trace...	Granular casts, Calcium Carbonate, no Oxalates.
„ 28th.	...	Do. ...	Do. ...	1,016	Nil ...	Considerable.	Granular casts.
„ 29th.	...	Do. ...	Do. ...	1,018	$\frac{1}{23}$	Nil ...	Granular casts, Carbonates and Oxalates.
„ 30th.	...	Turbid, viscid, orange.	Do. ...	1,022	$\frac{1}{50}$	Trace ...	Granular casts, Carbonates and Oxalates, bile and bile acids.
December 1st.	...	Turbid, viscid, green.	Do. ...	1,024	$\frac{1}{12}$	Do. ...	Do. do.
„ 2nd.	...	Do. ...	Do. ...	1,030	$\frac{1}{6}$	Nil ...	Do. do.

Date.	Quantity.	Colour.	Re-action.	Specific Gravity.	Albumen.	Phosphates.	Remarks.
1892							
December 3rd .	...	Turbid, viscid, green.	Alkaline .	1,030	$\frac{1}{8}$	Trace ...	Blood and granular casts, Carbonates, bile and bile acids.
,, 4th .	...	Do. ...	Do. ...	1,034	$\frac{1}{9}$	Nil ...	Blood and granular casts, bile and bile acids, Carbonates.
,, 5th .	...	Do. ...	Do. ...	1,024	Nil ...	Do.	
,, 6th .	...	Turbid, viscid, yellowish-green.	Do- ...	1,028	Do. ...	Do.	
,, 7th .	...	Turbid, viscid, green.	Do. ...	1,024	Do. ...	Do.	
,, 8th .	...	Turbid, viscid, yellowish-green.	Do. ...	1,028	Do. ...	Do. ...	Few red blood corpuscles, granular casts, few Oxalates, no Carbonates.
,, 9th .	...	Do. ...	Do. ...	1,022	Do. ...	Do. ...	Blood and granular casts, many free red corpuscles, no Carbonates or Oxalates.
,, 10th.	...	Do. ...	Do. ...	1,038	Do. ...	Do. ...	Do. do.
,, 11th.	...	Do. ...	Do. ...	1,024	Do. ...	Do. ...	Granular casts, no Carbonates, a few Oxalates.
,, 12th.	...	Turbid, viscid, orange.	Do. ...	1,020	Do. ...	Slight pp. of phosphates.	Do. do.
,, 13th.	...	Turbid, viscid, greenish-yellow.	Do. ...	1,020	A trace...	Nil ...	Granular casts, a few red blood corpuscles, no Carbonate crystals.
,, 14th.	...	Do. ...	Do. ...	1,022	Nil ...	Do. ...	Do. do.
,, 15th.	...	Turbid, viscid, orange.	Acid ...	1,028	Do. ...	Do. ...	Granular casts, a few red blood corpuscles, Oxalate but no Carbonate crystals.

Grey Arab Gelding ______ Age, aged Sex, Gelding ______ Colour, Grey ______

Disease, Naturally contracted 'Surra' ______ Date of Attack, 14th October 1892 ______ Result, Death ______ Date of Result, 15. 12. 92 ______ Register No. LXXIV ______

Dates of Observation	Oct. 26	27	28	29	30	31	Nov. 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Days of Disease	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Organisms in Blood								—	—	—	—	—	F	F	F	F	VN	N	N	N	VN	—	—



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RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

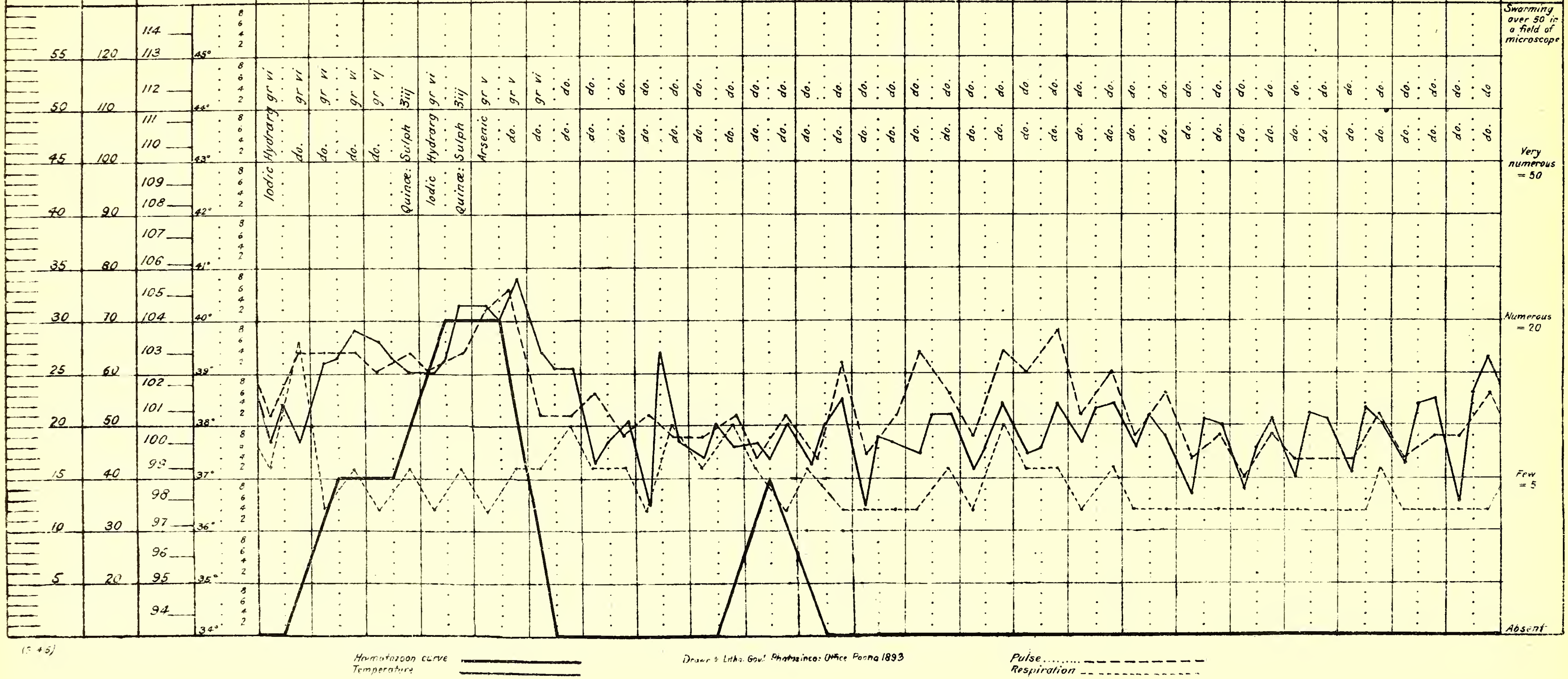
RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age Sex, Gelding Colour

Disease Date of Result Date of Result Register No. LXXIV

Dates of Observation.	Nov. 18	19	20	21	22	23	24	25	26	27	28	29	30	Dec. 1	2	3	4	5	6	7	8	9	10
Days of Disease	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58
Organisms in Blood.	—	F	F	N	N	—	—	—	—	F	—	—	—	—	—	—	—	—	—	—	—	—	—
Respiration per minute / Pulse per minute / Temperature F C	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.

Record of Organisms in Blood.



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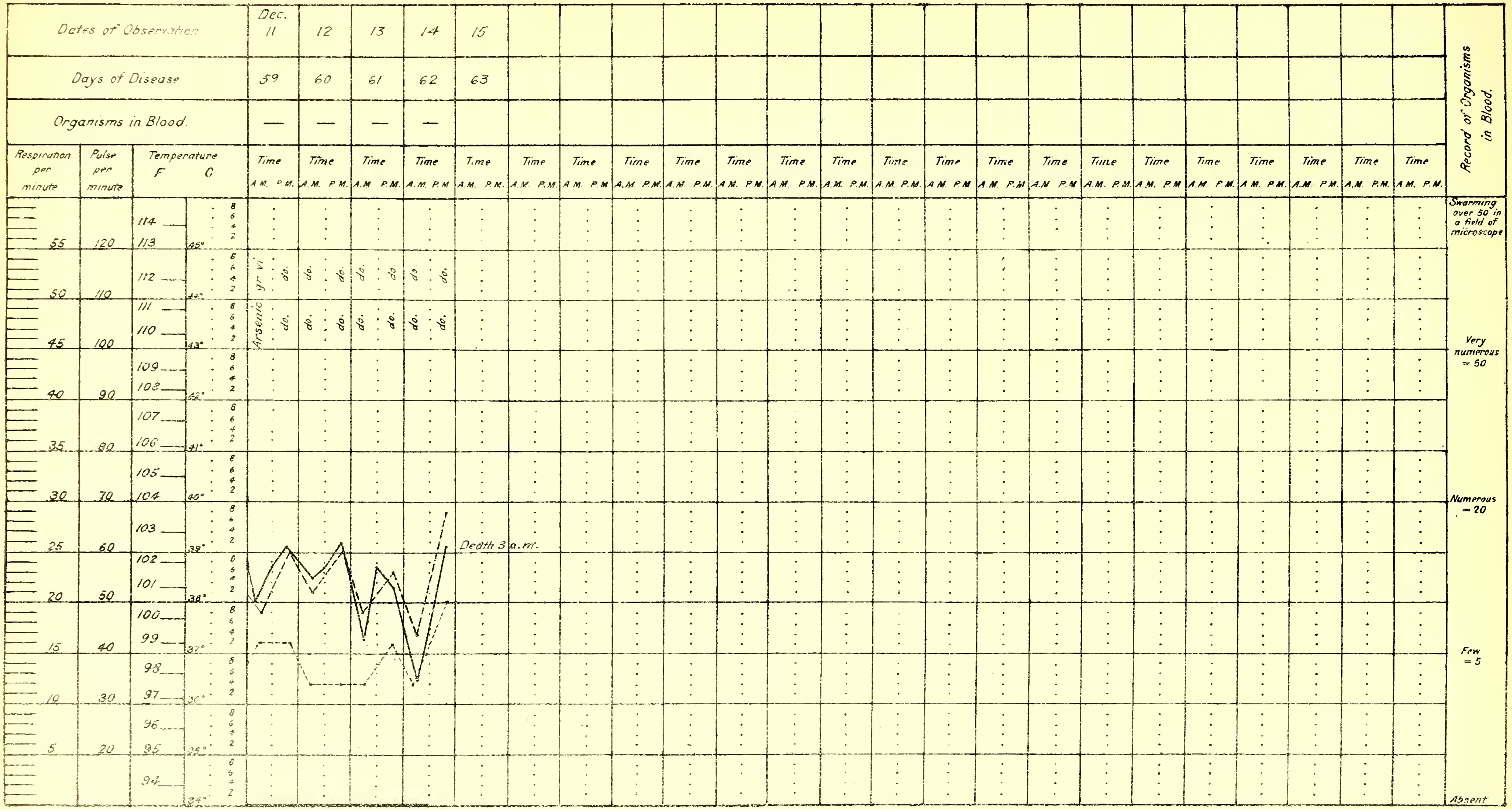
Age ___ Sex ___ Colour ___

Disease ___ Date of ___ Result ___ Date of Result ___ Register No. LXXIV ___



(S 415)

Hæmatozoon curve
Temperature

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Pulse
Respiration

CASE No. LXXVI—GREY AUSTRALIAN GELDING No. 328.—Aged 11 years, was purchased on the 8th October 1888. It was taken into the Bombay Tramway Company's Infirmary, suffering from fever, on the 8th November 1892. The hæmatozoon was discovered in the blood on the 25th November 1892.

26th November, 8 A.M.—Received at the Laboratory Hospital. *On admission.*—The animal presents a slightly dull appearance, but is in fine condition. The visible mucous membranes are very slightly tinged a yellow colour. There are several petechiæ dark-red in colour, on the conjunctiva of the left eye. The pulse is strong, regular, but of high tension, the respirations are normal. There is slight swelling and œdema of the hind-fetlocks, otherwise there is no other external symptom to be observed. The appetite is good and the evacuations normal in character. Temp. A.M. 39·2°C. P. 72. R. 12. There are a few hæmatozoa in the blood. Temp. 1 P.M. 39·7°C. Urine, turbid, viscid, greenish-orange, Sp. Gr. 1,014, alkaline and contains no albumen but a considerable amount of phosphates; two drops of Acetic Acid render the urine acid. Ordered four drachms of Liquor Potassæ in ten ounces of water twice daily. Temp. 5 P.M. 40·°C. P. 72. R. 32.

27th.—There is no alteration in the state of the animal. Temp. A.M. 39·1°C. P. 76 R. 20. The hæmatozoon is absent from the blood. Temp. 1 P.M. 39·4°C. The urine is yellowish-green in colour, Sp. Gr. 1,036, alkaline and contains no albumen; granular casts in numbers together with Carbonate and Oxalate of Calcium. Two doses of Liquor Potassæ nine drachms in all, were administered during the twenty-four hours. Temp. 5 P.M. 39·7°C. P. 80. R. 24.

28th.—The condition of the animal is unchanged. Temp. A.M. 38·4°C. P. 64. R. 12. There are a few hæmatozoa in the blood. Temp. 1 P.M. 39°C. Urine, turbid, viscid, dark-green in colour, Sp. Gr. 1,030, alkaline, contains albumen $\frac{1}{22}$nd, together with granular casts, a faint trace of bile and bile acids, crystals of Carbonate and a few Oxalate. Temp. 5 P.M. 41·1°C. P. 72. R. 24. Three doses of Liq. Potassæ each consisting of five drachms, in ten ounces of water were administered during the twenty-four hours.

29th.—The animal appears somewhat dull and there is a slight mucous discharge from the nostrils, the pulse is frequent but regular and markedly dicrotic, the individual pulsations are long, the vessel feels like a cord under the fingers. The appetite is good and the evacuations natural. Temp. A.M. 39·4°C. P. 72. R. 20. There are a few hæmatozoa in the blood. Temp. 1 P.M. 39·1°C. Urine, turbid, viscid, in colour resembles pea-soup, alkaline, Sp. Gr. 1,028, contains albumen $\frac{1}{15}$th also phosphates, granular casts, &c. Three doses of the medicine were given during the twenty-four hours. Temp. 5 P.M. 39·7°C· P. 72. R. 16.

30th.—This morning the animal appears dull. The visible mucous membranes are clean but the left conjunctiva presents four large petechiæ, dark-red in colour, the right being free. There is considerable swelling and œdema of the extremities, especially the hind-limbs, also slight œdema of the sheath. The pulse is frequent but weak, the respirations about normal. Temp. A.M. 39·3°C. P. 72. R. 20. The hæmatozoa are few in the blood. Temp. 1 P.M. 39·3°C. Urine, turbid, viscid, brownish-green in colour, Sp. Gr. 1,024, alkaline, contains albumen $\frac{1}{8}$th phosphates, granular casts and a few crystals of Carbonate and Oxalate of Calcium. Three doses of the Liq. Potassæ, each containing five drachms, were administered in water during the twenty-four hours. Temp. 5 P.M 39·5°C. P. 72. R. 20.

1st December.—The animal looks brighter this morning, but the disease continues to progress. The visible mucous membranes are tinged slightly yellow. There are five petechiæ involving the left conjunctiva, the right being free. The pulse is regular, but the beat is forcible and the vessel feels like a cord under the fingers; jugular regurgitation is present. The œdema of the limbs and sheath has increased and is now spreading along the under-surface of the abdomen. It has been determined to omit the medicine for the present, owing to a denuded patch about half an inch square on the floor of the right side of the mouth from which the mucous membrane has become detached. The appetite is excellent and the evacuations normal in character. Temp. A.M. 39·5°C. P. 68. R. 20. The hæmatozoa are few in the blood. Temp. 1 P.M. 39·3°C. Urine, turbid, viscid, brownish-green in colour, Sp. Gr. 1,026, alkaline, contains albumen $\frac{1}{8}$th, granular casts, phosphates, Carbonates and a few Oxalates. One dose of Liq. Potassæ ʒv was administered during the twenty-four hours. Temp. 5 P.M. 39·5°C. P. 68. R. 24.

2nd.—The condition of the animal is unchanged. Temp. A.M. 39·4°C. P. 72. R. 20. The hæmatozoa are numerous in the blood. Tem. 1 P.M. 39·3°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,020, alkaline and contains albumen $\frac{1}{3}$rd, slight precipitate of phosphates, granular casts but no crystals. Temp. 5 P.M. 40°C. P. 68. R. 28.

3rd.—The animal presents a dull appearance. The visible mucous membranes are of a dirty-yellow colour and the conjunctiva dotted over with petechiæ; the pulse-beat is forcible and quick, but regular. The œdema of the extremities continues and that on the under-surface of the belly is extending forwards. The appetite however remains very good and the evacuations are natural in character. Temp. A.M. 40°C. P. 68. R. 16. The hæmatozoa are numerous in the blood. Temp. 1 P.M. 39·7°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,026, neutral, contains $\frac{1}{12}$th albumen, numerous blood and a few epithelial casts together with a few pus cells, but no crystals of Carbonate or Oxalate . In consequence of the unsatisfactory condition presented by the animal and as no apparent effect has been produced on the hæmatozoon by the administration of the Liq. Potassæ, it has been decided to give Arsenic and to commence with the full physiological dose of four grains, to be repeated twice in the twenty-four hours. Temp. 5 P.M. 39·4°C. P. 72. R. 20.

4th.—The condition of the animal is unchanged. Temp. A.M. 39·3°C. P. 72. R. 24. The hæmatozoa are few in the blood. Temp. 1 P.M. 39·5°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,012, neutral and contains albumen $\frac{1}{6}$th together with blood and epithelial casts, pus cells, and a certain amount of bile pigment, but no crystals. Two doses of Arsenic were given in the 24 hours. Temp. 5 P.M. 39·4°C. P. 72. R. 22.

5th.—This morning the animal continues to present a dull appearance. There are numerous ecchymoses on the conjunctiva of left and a few in the right eye. Jugular regurgitation is well marked and the pulse-beat is abrupt, there being little or no perceptible difference in it, at the time of and after the impulse, the vessel feeling like a cord under the fingers. The sheath and extremities are the seat of considerable swelling and œdema, and the latter has spread forward along the under-surface of the abdomen and is now well marked between the fore-limbs. The appetite continues to be excellent and the evacuations normal in character. Temp. A.M. 38·3°C. P. 64. R 20. There are a few hæmatozoa in the blood. Temp. 1 P.M. 38·4°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,014, acid, contains albumen $\frac{1}{6}$th. Ten grains of Arsenic were administered during the twenty-four hours. Temp. 5 P.M. 39°C. P. 76. R. 24.

6th.—The condition of the animal is unchanged. Temp. A.M. 38·4°C. P. 64, R. 12. The hæmatozoa are very numerous in the blood. Temp. 1 P.M. 38·5°C. Urine, turbid, viscid, orange, in colour, Sp. Gr. 1,014, acid, and contains albumen $\frac{1}{11}$th. Ten grains of Arsenic were administered during the twenty-four hours. Temp. 5 P.M. 39°C. P. 68. R. 24.

7th.—The animal still continues to present a dull and semi-somnolent appearance. The œdema of the sheath is certainly reduced in amount, but the accumulation of exudation between the fore-legs has increased. The appetite however remains very good. Temp. A.M. 38°C. P. 64. R. 12. The hæmatozoa are few in the blood. Temp. 1 P.M. 38·5°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,012, acid, contains $\frac{1}{10}$th of albumen, granular casts, pus cells and a few Oxalates. Arsenic gr. xii was administered during the twenty-four hours. Temp. 5 P.M. 38·7°C. P. 64. R. 20.

8th—The condition of the animal is a little more satisfactory this morning; it does not appear quite so dull, the œdema of the sheath is certainly reduced in amount, and there is not quite so much swelling under the abdomen. The visible mucous membranes are cleaner and there are no fresh petechiæ on the conjunctivæ. The appetite continues very good. Temp. A.M. 37°C. P. 60. R. 12. There are a few hæmatozoa in the blood. Temp. 1 P.M. 37·7°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,012, alkaline, contains albumen $\frac{1}{3}$rd, granular casts, pus cells and a few Oxalates. Twelve grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·3°C. P. 64. R. 16.

9th—The animal presents a very dull appearance, the visible mucous membranes are exceedingly pallid, but there are no petechiæ present on the conjunctivæ. The pulse feels like a cord under the finger, the beat is forcible and dicrotic and of high tension. The appetite is good and the fæces normal in character. Temp. A.M. 38°C. P. 60. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·1° C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,014, alkaline, contains $\frac{1}{5}$th albumen, granular casts and pus cells. Fourteen grains of Arsenic were administered during the twenty-four hours. Temp. 5 P.M. 37·7°C. P. 64. R. 12.

10th—This morning the animal presents a very dull and semi-somnolent appearance. The pulse has not altered in character but the respirations have decreased in number per minute. The extremities are the seat of considerable swelling and œdema, as also the under-surface of the abdomen. The appetite has fallen off, and the animal has not eaten its corn. Temp. A.M. 37·4°C. P. 60. R. 8. The hæmatozoon is absent from the blood. Temp. 1 P.M. 36·5°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,014, alkaline, contains albumen $\frac{1}{11}$th, granular casts, pus cells and Oxalates, no Carbonates. Fourteen grains of Arsenic were given in water during the day. Temp. 5 P.M. 37·5°C. P. 60. R. 12.

11th.—The appearance of the animal is a little brighter, but the œdema of the limbs is as marked as yesterday, although there has been some absorption of that on the under-surface of the abdomen. The visible mucous membranes are cleaner and there is an absence of petechiæ on the conjunctivæ. The pulse is regular and not so hard. The respirations are normal. Temp. A.M. 37·5°C. P. 56. R. 16. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·5°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,016, alkaline, contains albumen $\frac{1}{5}$th, granular and blood casts, a few pus cells and Oxalate crystals. Twelve grains of Arsenic were given during the day. Temp. 5 P.M. 38°C. P. 64. R. 12.

12th.—This morning the animal again appears rather brighter, but there is no marked change. Temp. A.M. 37°C. P. 64. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·7°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,012, alkaline, contains albumen $\frac{1}{14}$th, together with blood and granular casts and a few pus cells, Oxalate but no Carbonate crystals. Twelve grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·1°C. P. 72. R. 12.

13th.—The condition of the animal is unchanged. Temp. A.M. 37·5°C.. P. 64. R. 8. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·8°C. Urine, turbid, viscid, smoky-red in colour, Sp. Gr. 1,014, alkaline, contains albumen $\frac{1}{13}$th, together with a few granular and blood casts, some free red blood corpuscles, no crystals. Fourteen grains of Arsenic were administered during the day. Temp. 5 P.M. 38·3°C. P. 72. R. 12.

14th—The animal is certainly brighter and has improved in every way, the most marked feature in the change being the absorption of exudation from the under-surface of the abdomen and the extremities ; the latter are only half the size they exhibited previously. The visible mucous membranes are cleaner, and there are no petechiæ on the conjunctivæ. The pulse is softer in character and the vessel which previously felt like a hard cord under the finger, presents a more healthy character. The appetite is very good and the Arsenic appears to have brought about a considerable change for the better. Temp. A.M. 37·6°C. P. 60. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·5°C. Urine, turbid, dark-brown, Sp. Gr. 1,012, alkaline, contains albumen $\frac{1}{7}$th, a few granular and blood casts, free blood corpuscles, but no crystals. Fourteen grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 37·6°C. P. 64. R. 12.

15th.—The condition of the animal is unchanged. Temp. A.M. 37·4°C. P. 56. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·2°C. Urine, turbid, dark-brown, Sp. Gr. 1,019, alkaline, contains albumen $\frac{1}{5}$ th, red blood corpuscles and leucocytes, no casts nor crystals. Twelve grains of Arsenic were given during the day. Temp. 5 P.M. 37·4°C. P. 60. R. 12.

16th.—This morning the animal presents a dull, heavy appearance. The visible mucous membranes are slightly tinged yellow in colour. There are four fresh petechiæ on the conjunctival membranes of the right eye and two on the left, whilst lachrymation is present. The animal is rapidly losing flesh which is especially noticeable about the glutei muscle. The œdema has nearly all disappeared from the belly, sheath and front legs ; the lower portion of the hind-legs still presents a slight amount of swelling and œdema. The pulse is hard, forcible and of high tension, as well as being markedly dicrotous. The respirations are normal. There is no discharge from the nostrils or cough. The appetite is fairly good, but constant gurgling is heard in the intestines. The fæces are natural in character. Temp. A.M. 37·1°C. P. 56. R. 8. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·1°C. Urine, turbid, orange in colour, Sp. Gr. 1,016, alkaline, contains albumen $\frac{1}{8}$th, red blood corpuscles, leucocytes, no casts or crystals. Twelve grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 37·5°C. P. 56. R. 12.

17th.—There is a slight improvement in the condition and appearance of the animal this morning ; it is brighter. The swelling and œdema is less than yesterday and the appetite has improved. Temp. A.M. 37·8°C. P. 52. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·6°C. Urine, turbid, dark-brown in colour, Sp. Gr. 1,014, alkaline, contains albumen $\frac{1}{6}$th, red blood corpuscles and leucocytes, no casts or crystals. Twelve grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 37·7°C. P. 72. R. 12.

18th.—The improvement of yesterday is still maintained, although the pulse was higher last night than it has been since the 5th instant. The visible mucous membranes have lost their yellow tinge and the conjunctivæ are free from petechiæ. The appetite is very good and the evacuations appear natural in character. Temp. A.M. 37·6°C. P. 60. R. 8. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38°C. Urine, turbid, orange in colour, Sp. Gr. 1,014, alkaline, contains albumen $\frac{1}{7}$th, red blood corpuscles, leucocytes, no casts or crystals. Twelve grains of Arsenic were administered during the twenty-four hours. Temp. 5 P.M. 37·8°C. P. 64. R. 12.

19th.—The general condition of the animal is unchanged. Temp. A.M. 37·1°C P. 64. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·2°C. Urine, turbid, smoky-red in colour, Sp. Gr. 1,016, alkaline, contains albumen $\frac{1}{5}$th, together with red blood corpuscles and leucocytes but neither casts nor crystals. Twelve grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 37·7°C. P. 64. R. 16.

20th.—The general condition of the animal is unchanged. Temp. A.M. 36·6°C., P. 56. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 36·6°C. Urine, turbid, smoky-red in colour, Sp. Gr. 1,014, alkaline, contains albumen $\frac{1}{5}$th, together with red blood corpuscles and leucocytes, but neither casts nor crystals. Twelve grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 37·°C. P. 52. R. 16.

21st.—The general condition of the animal is unchanged. Temp. A.M. 36·6°C. P. 51. R. 8. The hæmatozoon is absent from the blood. Temp. 1 P.M. 36·6°C. Urine, turbid, smoky-red in colour, Sp. Gr. 1,014, alkaline, contains albumen $\frac{1}{6}$th, together with red blood corpuscles and leucocytes but neither casts nor crystals. Twelve grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 36·8°C. P. 60. R. 16.

22nd December.—The animal is somewhat brighter, but the loss in condition is becoming exceedingly marked, atrophy of the muscles is most marked round the hip-joints and especially the Glutei, the animal presenting a tucked-up appearance. The visible mucous membranes are clean, but there are numerous fresh petechiæ on the conjunctivæ. The œdema of the legs, abdomen and sheath has entirely disappeared. The appetite is very good and the evacuations healthy in character. Temp. A.M. 36·7°C. P. 60. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·6°C. Urine, turbid, sherry-coloured, Sp. Gr. 1,016, alkaline, contains $\frac{1}{5}$th, albumen, together with red blood corpuscles, leucocytes, no casts nor crystals. Ten grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 37·3°C. P. 60. R. 12.

23rd.—The general condition of the animal is unchanged. Temp. A.M. 36·6°C. P. 52. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37°C. Urine, turbid, dark sherry-coloured, Sp. Gr. 1,014, alkaline, contains albumen $\frac{1}{5}$ th, red blood corpuscles and leucocytes. Ten grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 37°C. P. 60. R. 12.

24th.—The general condition of the animal is unchanged. Temp. A.M. 35·8°C. P. 56. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 35·8°C. No urine collected. Eight grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 36·6°C. P. 64. R. 12.

25th.—The general condition of the animal is unchanged. Temp. A.M. 36·2°C. P. 60. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 36·7°C. No urine collected. Eight grains of Arsenic were given during the twenty-four hours, Temp. 5 P.M. 37·1°C. P. 64. R. 12.

26th.—The animal is rapidly losing flesh; there are a large number of claret-coloured extravasations on the left membrana nictitans, but few in the right. The pulse is frequent, the beat somewhat forcible and abrupt, but varies every few beats in intensity. The respirations remain low, 12 per minute. There is no swelling or œdema of the extremities or sheath, but a small amount between the fore-limbs which is rapidly disappearing. The appetite is good and the evacuations healthy. Temp. A.M. 36·6°C. P. 60. The hæmatozoon is absent from the blood. Temp. 1 P.M. 36·7°C. Urine, turbid, orange in colour, Sp. Gr. 1,012, alkaline, contains albumen $\frac{1}{16}$ th, red blood corpuscles, no casts or crystals. Eight grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 37·6°C. P. 64. R. 12.

27th.—The condition of the animal is unchanged. Temp. A.M. 36·7°C. P. 64. R. 20. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·6°C. Urine, turbid, orange. Sp. Gr. 1,012, alkaline, contains albumen $\frac{1}{8}$th, red blood corpuscles, leucocytes, no casts or crystals. Eight grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 37·2°C. P. 72. R. 12.

28th.—The general condition of the animal is unchanged, Temp. A.M. 36·3°C. P. 60. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 36.°C. Urine, turbid, sherry-coloured, Sp. Gr. 1014, alkaline, contains albumen $\frac{1}{7}$th, red blood corpuscles, no casts or crystals. Eight grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M 37·6°C. P. 68. R. 12.

29th.—The general condition of the animal is unchanged. Temp. A.M. 36·6°C. P. 60. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37°C. Urine, turbid, orange in colour, Sp. Gr. 1,012, alkaline, contains albumen $\frac{1}{9}$th, red blood corpuscles, no casts or crystals. Eight grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 37·3°C. P. 64. R. 12.

30th.—The emaciation is becoming daily more and more pronounced, and the animal is now so thin that the girth of the body just in a line with the sheath is only 57 inches. This condition produces an effect very similar to that observed in a grey-hound. The visible mucous membranes are tinged a yellow colour and present very numerous and extensive extravasations invading the conjunctivæ. The pulse is regular but not so forcible as previously described, 72. Resp. 12. The appetite remaining good and the fæces healthy in character. Temp. A.M. 36·7°C. The hæmatozoon is absent from the blood. Temp. 1 P.M. 36·5°C. Urine, turbid, orange, Sp. Gr. 1,014, alkaline, contains albumen $\frac{1}{9}$th, red blood corpuscles, no casts or crystals. Six grains of Arsenic were given in the twenty-four hours. Temp. 5 P.M, 37·2°C. P. 64. R. 12.

31st.—The general condition of the animal is unchanged. Temp. A.M. 37·2°C. P. 64. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 36·3°C. Urine, turbid, orange in colour, Sp. Gr. 1,014, alkaline, contains albumen $\frac{1}{8}$th, a few red blood corpuscles no casts, some vesical epithelium but no crystals. Six grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 37·2°C. P. 68. R. 16.

1st January 1893—The general condition of the animal is unchanged. Temp. A.M. 36°C. P. 64. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 36·7°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,014, alkaline, contains albumen $\frac{1}{13}$th, a few red blood corpuscles, no casts and no crystals. Three grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 37·6°C. P. 64. R. 16.

2nd—.The condition of the animal is unchanged. Temp. A.M. 36·7°C. P. 60. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 36·5°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,014, alkaline, albumen $\frac{1}{13}$th, few red blood corpuscles, but no casts or crystals. Three grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 36·7°C. P. 64. R. 8.

3rd—It is difficult to say whether the animal continues to lose flesh as it is merely skin and bone, but it is able to walk some fifty yards without any apparent exertion. The visible mucous membranes retain the yellow tinge and the conjunctivæ are deeply petechiated. The appetite however continues good, but the fæces are light in colour and some of the dung balls are coated with mucus. Temp. A.M. 36·7°C. P. 64. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 36·8°C. Urine, turbid, orange in colour, Sp. Gr. 1,012, alkaline, contains albumen $\frac{1}{10}$ th, together with a few red blood corpuscles, but no casts or crystals. Three grains of Arsenic were given this morning, but the dose has been increased to gr. iv this evening. Temp. 5 P.M. 37·4°C. P. 64. R. 12.

The animal fell at 12-30 A.M. and death took place at 9-30 A.M.

AUTOPSY.—At 11 A.M., January 4th, 1893.

The body is extremely emaciated. There is a complete absence of subcutaneous adipose tissue and œdema from the extremities and under-surface of the abdomen. *Thorax.*—There is no fluid in the pleural cavities and no pleuritic adhesions. *Lungs, Right.*—The anterior half presents a light pink colour, dotted over with sub-pleural petechiæ, circular in form and dark-purple in colour, varying in size from $\frac{1}{12}$th to $\frac{1}{6}$th of an inch in diameter. The apex is the seat of a localized emphysema. The posterior half of the organ is of a dark-purple colour, but it is difficult to make out any petechiæ on its surfaces. *On Section,* the anterior portion presents a perfectly healthy condition with the exception of the apex; the posterior portion, a dark red colour; on pressure a large quantity of deeply blood-stained fluid mixed with air exudes from the cut surfaces. *Left.*—The anterior lobe is the seat of a localized emphysema. The *inferior border* encroaching on the tissues for a variable distance from 2 to 4 inches, presents a dark red colour and is the seat of consolidation. There is also a small round patch in the centre of the superior surface of the organ which is dark red in colour, and on manipulation is found to be solid and about the size of a Tangurene orange in size. *On section,* the consolidated inferior border is found to be the seat of a lobular pneumonia, whilst yellow, muco-purulent material exudes from the cut ends of the tubes. The round consolidated patch contains an irregular shaped cyst which has thickened walls of a greyish-green colour, but the cavity of which is empty. The posterior portion of the organ presents a slight amount of œdema.

The cavity of the pericardium contains four ounces of a pale amber-coloured fluid. *Heart* weighs 7lbs. 7½ozs. Both sides are somewhat contracted. The base and the origins of the great vessels are surrounded by a certain amount of amber-coloured exudation, which is dotted over with a few sub-pericardial ecchymoses. The muscular structure of the organ is however free from them. *On section,* the cavities contain a certain amount of dark semi-solid blood-clots, but all of them are free from sub-endocardial extravasations. The muscular wall of the *right ventricle* varies in thickness from $\frac{5}{8}$th to $\frac{7}{8}$th of an inch, that of the *left ventricle* from 2″ to 1·75″ at its thickest part, to ½ inch at the apex. Abdominal cavity contains six ounces of an amber-coloured fluid. *Liver* weighs 11 lbs. 11½ozs. It is normal in size, but the anterior surface of the right lobe shows signs of old perihepatitis. *On section,* the tissues present a dark red appearance but they appear healthy in structure. *Spleen* weighs 1 lb. 9½ozs. It is normal in size and dotted over with bright red sub-capsular petechiæ. *On section,* the tissues are firm and apparently healthy. *Kidneys.*—Considerably enlarged. *Right* wieghs. 2 lbs 8½ozs. *Left* 2 lbs. 9ozs. The capsules strip easily, and reveal the presence of a large number of petechiæ, violet in colour, dotted over the whole cortical surfaces of both organs, the intervening substances being of a greyish-brown colour. *On section,* the *cortical* portion is found to present the same colour internally as externally and the substance invaded by the same coloured petechiæ. The *medullary* portion presents a healthy appearance. *Stomach* is distended with semi-digested food, externally presents nothing for observation, but on manipulation, a hard lump is felt at the most dependent portion nearer to the pyloric than to the cardiac end of the organ. *On section,* the *cuticular* portion presents a healthy appearance. The mucous membrane of the *villous* portion also appears healthy, except for the presence at the fundus of a tumor due to the "*Spiroptera Megastoma*" measuring $2\frac{1}{8}'' \times 1\frac{9}{16}'' \times 1''$ with one large hole of entrance on its summit; a second tumour of smaller dimensions is situated laterally on the left wall midway between the greater and lesser curvatures. On either side of the line of demarcation or crest which divides the coat of the stomach, a bright orange material is present. This is only slightly visible on the cuticular surface, but extends as a continuous band three inches wide on the villous surface of the mucous membrane. *Small Intestines.* There are several patches of congestion visible involving the sub-mucous layer, but no ecchymoses. Peyer's patches however, especially those situated in the lower portion of the Ileum, are œdematous and the tissues are therefore thickened, but there is no sign of inflammation or ulceration. *Large Intestine.*—With the exception of one patch 4″ × 3″ over which the vessels present an aborescent appearance, there is nothing to note. *Rectum* presents a healthy appearance. Not a single parasite was found in the intestinal tract.

Bladder contains forty-two ounces of a turbid, viscid fluid, orange in colour, Sp. Gr. 1,013, acid in re-action. A few petechiæ are visible dotted over the under-surface of the mucous membrane.

Remarks.—This animal 11 years of age, four years in the country, suffered from fever on 8th November 1892. The Surra hæmatozoon was discovered in the blood on 25th November 1892. Received at the Laboratory Hospital on 26th November 1892. On its admission the temperature was 39·2°C., P. 72, R. 12, and the blood contained a few organisms. In this case it was determined to try the effect of Liq. Potassæ in large doses on the hæmatozoon and as the temperature rose the same evening to 40°C., a dose of drachms iv was administered. On the morning of the 27th the temperature was 39·1°C., P. 76, R. 20, and the hæmatozoon absent from the blood, but by evening the temperature had again risen to 39·7°C. P. 80, R. 24. Nine drachms of Liq. Potassæ were given during the twenty-four hours. By the 28th, temperature, pulse and respirations had all fallen considerably, but the organism had again made its appearance in the blood. The urine was found to contain, in addition to albumen $\frac{1}{22}$nd and casts, a trace of bile and bile acids. At 5 P.M. the temperature was 40·2°C. P. 72. R. 24. Three doses of medicine were administered during the day. On the morning of the 29th, the animal presented a dull appearance and there was a slight mucous discharge from the nose; the temperature had fallen a degree during the night, but the pulse was dicrotic and registered the same as on the previous evening and the hæmatozoa were few in the blood; three doses of the medicine were repeated. On the 30th, the animal again presented a dull appearance, the visible mucous membranes were clean, but the conjunctiva petechiated; there was also considerable œdema of the extremities, especially the hind limbs, and the sheath presented the same condition but to a more limited extent.

Temperature A.M. 39·3°C. P. 72. R. 20. Hæmatozoa few in the blood. Three doses of medicine were repeated. *December 1st.*—The animal looked brighter but the disease continued to progress; the visible mucous membranes were tinged yellow, and the left conjunctiva invaded by five large petechiæ. The pulse was regular but the beat forcible, and jugular regurgitation was present. The hæmatozoon however was still present in the blood and the œdema of the sheath and extremities had increased in amount.

Owing to the presence of a denuded patch on the floor of the mouth from which the mucous membrane had been accidentally removed whilst administering the medicine, it was decided to omit any further doses of Liq. Potassæ until the abrasion had healed. Up to this time the animal had received sixty-three drachms of Liq. Potassæ in thirteen doses, equivalent to about 220 grains of Hydrate of Potassium; the disease had continued to progress during the administration of this chemical, but it had in no way disarranged the organs of digestion, for the appetite is noted on this date as excellent. On the other hand the albumen in the urine had steadily increased in amount during its exhibition, but it is difficult to say to what extent, if any, the increase of albumen was due to the large doses of Potash.

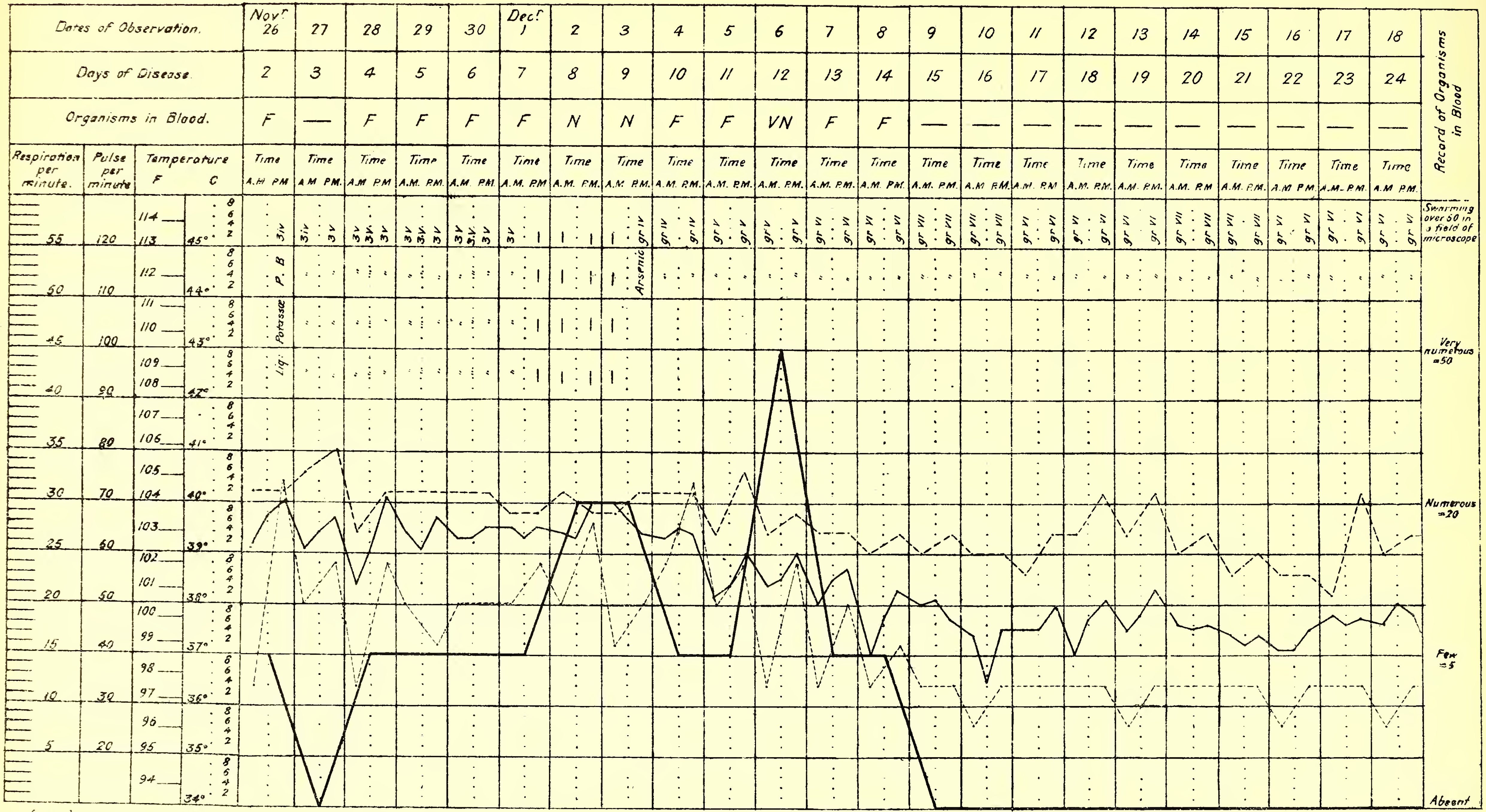
On *December 2nd* the temperature was 39·4°C. P. 72. R. 20. The hæmatozoa had increased and were now numerous in the blood but the general condition of the animal was unchanged. On the morning of the 3rd the temperature maintained the degree registered on the previous evening, pulse 68, but the respirations had fallen to 16 per minute and the organisms were still numerous in the blood. The pulse-beat was forcible and quick, but regular. The œdema on the under-surface of the abdomen had extended forward and the albumen in the urine had attained to $\frac{1}{3}$rd, in addition there were numerous blood and epithelial casts and a few pus cells. On experimentation the re-action for bile pigment was well marked. In consequence of the unsatisfactory condition presented by the animal it was decided not to recommence the administration of the Liq. Potassæ but to substitute Arsenic for it, commencing with the full physiological dose of four grains to be repeated twice in the twenty-four hours.

On the evening of the *3rd December*, Temp. was 39·4°C. P. 72. R. 20. The first dose of grains iv was given after the evening meal in the drinking water in the form of Liq. Arsenicalis. On the following morning the temperature was 39·2°C., the pulse remained as before, but the respirations had increased to 24 per minute. The hæmatozoa were few in the blood. The same dose of Arsenic was continued, making eight grains in all. On the morning of the 5th, the temperature had fallen to 38·2°C., the pulse to 64, and respirations 20, but the animal presented a dull appearance, and the general symptoms of disease were intensified, but still the appetite remained excellent. There were a few hæmatozoa in the blood. At 5 P. M. the same evening the pulse had again increased in frequency and registered 76 per minute. Temp. 39°C. R. 24. Ten grains of Arsenic were given during the day. On the morning of the 6th, the temperature had fallen half a degree, pulse 64, respirations 12, but the hæmatozoa were very numerous in the blood. The same dose of Arsenic was continued. By the following morning the temperature had again fallen a degree, but the organism was still present in the blood, although in small numbers. The animal continued to present a dull and semi-somnolent appearance and the œdema had increased in amount between the fore-legs. In the evening the thermometer registered two-thirds of a degree above the morning observation. Arsenic increased to grains vi bis die. During the following night the temperature fell and at 8 A. M. registered 37°C. in the rectum, the pulse was 60, respirations 12. There were a few hæmatozoa in the blood, but the appearance of the animal was brighter, and the œdema on the under-surface of the abdomen was slightly reduced in amount. The temperature however

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION

Australian Gelding ______ Age, 11 ______ Sex, Gelding ______ Colour Grey ______

Disease, "Surra" naturally contracted ______ Date of Attack, Nov. 25 1892 ______ Result, Death ______ Date of Result, 4.1.93 ______ Register No LXXVI



(S. 415)

Hæmotozon Curve ————
Temperature...... ————

Drawn & Litho: Gov^t Photozinco: Office, Poona 1893.

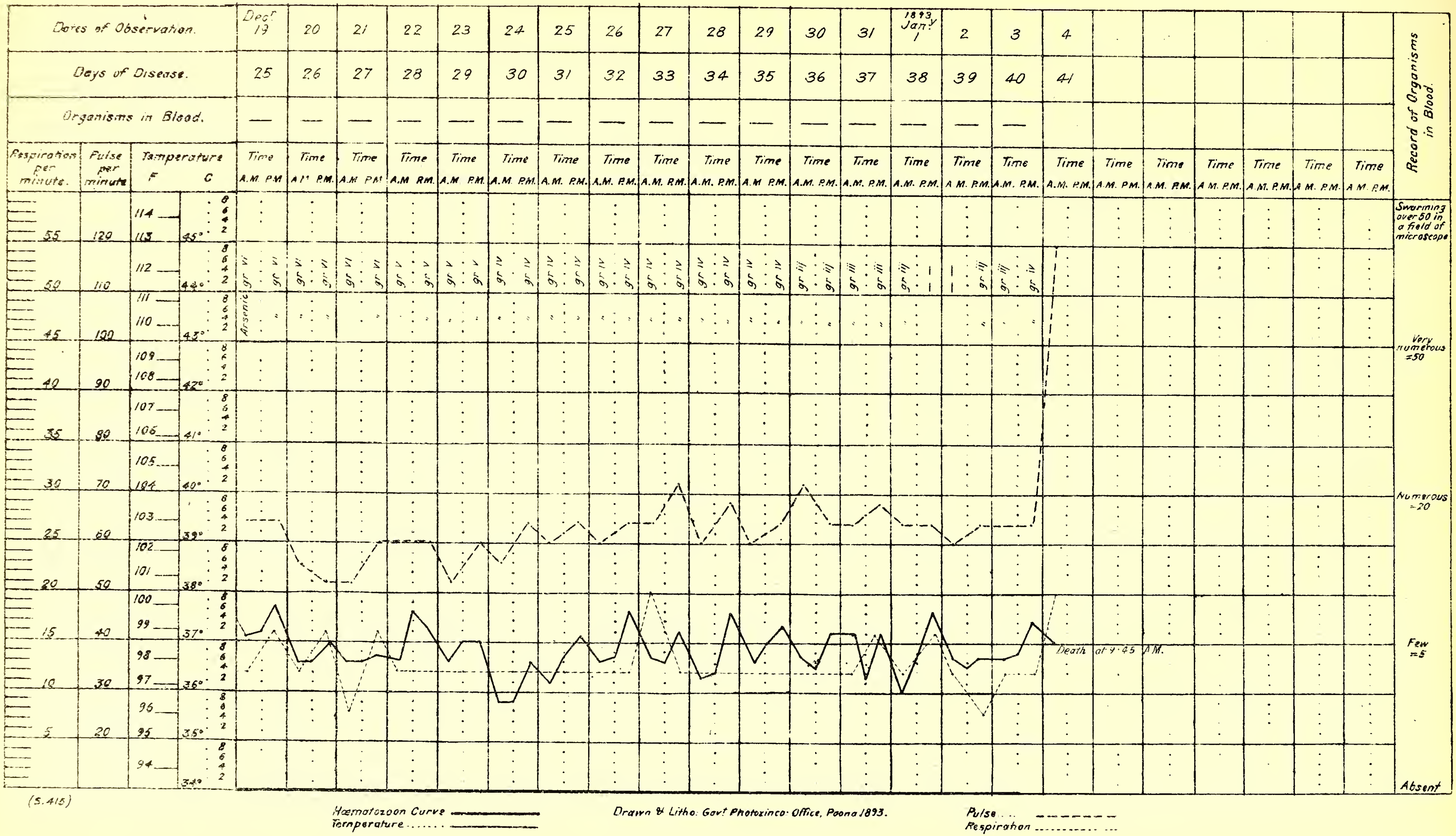
Pulse ...... – – – – – –
Respiration ....

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION

Age, _____ Sex, _____ Colour, _____

Disease _____ Date of _____ Result, _____ Date of Result, _____ Register No. LXXVI



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Drawn & Litho: Gov^t Photozinco Office, Poona 1893.

again rose in the evening a little over a degree and registered 38°C. on the morning of the 9th, the pulse being 60 and respirations 12, but the hæmatozoon was absent from the blood. It will thus be observed on reference to the chart, that five days and a half had elapsed since the commencement of the Arsenical treatment and during that period, fifty-six grains had been given in the drinking water. For the next two days the dose was increased to fourteen grains per diem, in order to try and effect the destruction of any immature forms of the organism which might be present in the blood. The temperature on the morning of the second day registered 36·5°C., the animal presented a brighter appearance and some further absorption of the exudation on the under-surface of the abdomen had taken place, although that of the limbs continued unabated. During the period which elapsed between the 11th of December 1892 and the 4th January 1893, the Arsenical treatment was continued. The Surra hæmatozoon was absent from the blood.

The maximum dose of grains vii was again exhibited on the 14th and 15th December, but from the latter date it was gradually reduced by one grain at a time until the minimum of grains iii was reached on the 3rd January. On the 16th December the animal commenced to lose flesh rapidly, although previous to that date it had become to a certain extent emaciated within the limits of health. From this date, however, in spite of the amount of food consumed, progressive atrophy of the muscles set in, especially along either side of the spinal column and those surrounding the hip-joints and buttocks. The œdema of the extremities and under-surface of the abdomen, entirely disappeared and as before mentioned the girth of the animal's body just in line with the sheath measured only 57 inches. No doubt this can be readily accounted for by the condition of the kidneys, for, during a period of nearly five weeks, a large amount of albumen was found in the urine varying between $\frac{1}{3}$rd and $\frac{1}{22}$nd but only on one occasion as low as $\frac{1}{40}$th. Epithelial, blood and granular casts were present for the first eighteen days of the disease and were followed by hæmaturia varying in amount for twenty days, during which period no casts or crystals were discovered in the urine.

From the evening of the 3rd December 1892 until the evening of the 3rd of January 1893 three hundred and one grains of Arsenic in the form of Liq. Arsenicalis were given in the drinking water and the hæmatozoon was absent from the blood for a period of twenty-seven days.

RECORDS OF URINE.

Animal, Grey Australian. No. LXXVI., Disease, naturally contracted Surra.

Date.	Quantity.	Colour.	Re-action.	Specific Gravity.	Albumen.	Phosphates.	REMARKS.
1892.							
November, 26	..	Turbid, viscid, greenish-orange.	Alkaline	1,014	Nil.	Considerable amount.	Granular casts in number, Calcium Carbonate crystals.
27	..	Turbid, viscid, pea-soup.	Do.	1,036	1/40th	Precipitate	Do. do.
28	..	Do.	Do.	1,035	1/22nd	Do.	Do. do.
29	..	Do.	Do.	1,028	1/15th	Do.	Do. do.
30	..	Turbid, viscid, brownish-green.	Do.	1,024	1/8th	Do.	Granular casts, few Carbonates and Oxalates.
December, 1	..	Do.	Do.	1,026	1/7th	Slight precipitate.	Do. do.
2	..	Turbid, viscid, orange.	Do.	1,020	1/3rd	Do.	Blood numerous and few epithelial casts, pus cells, no crystals, re-action for bile well marked.
3	..	Do.	Neutral	1,026	1/12th	Trace	
4	..	Do.	Do.	1,012	1/6th	Nil	Do. do.
5	..	Do.	Acid	1,014	1/9th	Nil	Do. do.
6	..	Do.	Do.	1,014	1/11th	Nil	Granular casts, pus cells, a few Oxalates.
7	..	Do.	Do.	1,012	1/10th	Nil	Do. do.
8	..	Do.	Alkaline	1,012	1/3rd	Nil	Granular casts, pus cells, Oxalates, no Carbonates.
9	..	Do.	Do.	1,014	1/5th	Nil	Do. do.
10	..	Do.	Do.	1,014	1/11th	Nil	Do. do.
11	..	Do.	Do.	1,016	1/5th	Nil	Granular and blood casts, a few pus cells and Oxalates.
12	..	Do.	Do.	1,012	1/14th	Nil	Few granular and blood casts, free red-blood corpuscles, no crystals.
13	..	Do.	Do.	1,014	1/13th	Nil	
14	..	Turbid, smoky-red.	Do.	1,012	1/7th	Nil	
15	..	Do.	Do.	1,019	1/5th	Nil	Red blood corpuscles and no casts, no crystals.
16	..	Do.	Do.	1,016	1/8th	Nil	Do. do.
17	..	Do.	Do.	1,014	1/6th	Nil	Do. do.
18	..	Do.	Do.	1,014	1/7th	Nil	Do. do.
19	..	Do.	Do.	1,016	1/5th	Nil	Do. do.
20	..	Do.	Do.	1,014	1/5th	Nil	Do. do
21	..	Do.	Do.	1,014	1/6th	Nil	Do. do.
22	..	Do.	Do.	1,016	1/5th	Nil	Do. do.
23	..	Do.	Do.	1,014	1/5th	Nil	Do. do.
26	..	Turbid, orange	Do.	1,012	1/16th	Nil	No casts, red blood corpuscles, no crystals.
27	..	Do.	Do.	1,012	1/8th	Nil	Do. do.
28	..	Turbid, faint-red.	Do.	1,014	1/7th	Nil	Do. do.
29	..	Turbid, orange	Do.	1,012	1/9th	Nil	Do. do.
30	..	Turbid, reddish-yellow.	Do.	1,014	1/9th	Nil	No casts, a few red blood corpuscles some vesical epithelium, no crystals.
31	..	Turbid, orange	Do.	1,014	1/8th	Nil	Do. do.
1893.							
January, 1	..	Turbid, viscid-yellow.	Do.	1,014	1/13th	Nil	Do. do.
2	..	Turbid, viscid, orange.	Do.	1,014	1/13th	Nil	Do. do.
3	..	Turbid, orange	Do.	1,012	1/10th	Nil	Do. do.
4	..	Turbid, viscid, pale-yellow.	Acid	1,013	Nil.	Nil	Do. do.

CASE No. LXXVII.—BAY GELDING *No.* 325, *Breed Persian. Aged* 13 *years.* Was purchased on the 26th November 1886. It was first observed to be suffering from fever on the 20th November 1892, on which date it was admitted into the Bombay Tramway Company's Infirmary. The Surra hæmatozoon was first discovered in the blood on 27th November.

29th November 1892.—Received at the Laboratory Hospital.

On admission.—The animal looks bright and lively, and is in very good condition. The visible mucous membranes are, however, tinged slightly yellow, but there are no petechiæ visible on the conjunctivæ. The pulse is frequent, 56 beats per minute, and dicrotic, the vessel feels like a cord under the finger, the walls being somewhat thickened, but smooth. There is no swelling or œdema of the extremities or of the under-surface of the abdomen. The appetite is very good, and the evacuations natural in character. Temp. A.M. 39·2°C. P. 56. R. 24. The hæmatozoa are numerous in the blood. Temp. 1 P.M. 40·3°C. Urine not collected. At 5-30 P.M. an Urticaria appeared, sparsely scattered over the body. Temp. 5 P.M. 39·1°C. P. 56. R. 28.

30th.—This morning the Urticarial eruption is more thickly scattered over the body; it is best marked on the neck, especially along the sides of the jaws, belly and hind limbs, with a few patches on the front legs as far down as the knees; otherwise the condition of the animal is unchanged. Temp. A.M. 38·6°C. P. 52. R. 12. The hæmatozoa are very numerous in the blood. Temp. 1 P.M. 39·7°C. Urine not collected. At 5 P.M. the eruption was not so well marked as previously, but it was still discernible. Temp. 5 P.M. 39·6°C. P. 56. R. 28. Arsenic gr. iv was administered in water.

1st December.—The eruption of Urticaria is again well marked this morning, involving the same parts as yesterday. The animal nevertheless appears bright and lively. The visible mucous membranes have almost assumed their normal hue, but there is one ecchymosis on the conjunctiva of the left eye, purple in colour. The limbs and abdomen continue to be free from swelling and œdema. Temp. A.M. 39·2°C. P. 52. R. 20. The hæmatozoa are numerous in the blood. Temp. 1 P.M. 39·1°C. Urine, viscid, turbid, orange in colour, Sp. Gr. 1,030, alkaline, contains albumen $\frac{1}{10}$th; no phosphates, no casts; Carbonates and Oxalates of Calcium. Two doses of medicine were administered during the twenty-four hours. Temp. 5 P.M. 39·1°C. P. 48. R. 28.

2nd.—The Urticarial eruption, which had almost faded away last evening, is again well marked this morning, especially on the neck, chest and abdomen, especially the latter; the individual patches of the eruption are, however, smaller than usual, but thickly scattered over the surface of the skin; but the general condition and appearance of the animal is more satisfactory than previously. Temp. A.M. 38°C. P. 52. R. 20. The hæmatozoa are few in the blood. Temp. 1 P.M. 38·5°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,036, alkaline, contains albumen $\frac{1}{3}$rd; slight precipitate of phosphates; a few granular casts and crystals of Carbonate and Oxalate of Calcium. Ten grains of Arsenic were administered during the twenty-four hours. Temp. 5 P.M. 38·7°C. P. 48. R. 20.

3rd.—The eruption has again become well marked over the sides of the neck, chest and fore-limbs; there are only a few patches visible on the abdomen and hind limbs; the back and hips are quite free from it. Temp. A.M. 38·6°C. P. 52. R. 16. The hæmatozoon is absent from the blood. Temp. 1 P.M. 39·3°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,040, alkaline, contains no albumen; needle crystals of Carbonate and Oxalate of Calcium. Two doses of Arsenic, grs. xii in all, were given during the twenty-four hours. Temp. 5 P.M. 38·4°C. P. 56. R. 20.

4th.—The eruption has entirely disappeared, and the animal this morning is bright and lively. Temp. A.M. 37·4°C. P. 44. R. 20. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·4°C. Urine, turbid, viscid, orange; Sp. Gr. 1,038, alkaline, contains no albumen, but crystals of Carbonate and Oxalate of Calcium. Two doses of Arsenic, grs. x, were administered during the twenty-four hours. Temp. 5 P.M. 38·4°C. P. 44. R. 20.

5th.—The condition of the animal is unchanged. Temp. A.M. 37·5°C. P. 52. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·7°C. Urine, turbid, viscid, yellow in colour; Sp. Gr. 1,040, alkaline, contains no albumen. Two doses of Arsenic, amounting to grs. x in all, were given during the day. Temp. 5 P.M. 38°C. P. 48. R. 12.

6th.—The condition of the animal is unchanged. Temp. A.M. 37·2°C. P. 36. R. 12. There are a few hæmatozoa in the blood. Temp. 1 P.M. 37·7°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,037, alkaline, contains no albumen; crystals of Carbonates and Oxalates. Ten grains of Arsenic were administered during the twenty-four hours. Temp. 5 P.M. 38·2°C. P. 44. R. 16.

7th.—The condition of the animal is unchanged. Temp. A.M. 37·2°C. P. 40. R. 20. There are a few hæmatozoa in the blood. Temp. 1 P.M. 38°C. Urine, turbid, viscid, greenish in colour, Sp. Gr. 1,040, alkaline, contains no albumen, but crystals of Carbonate and Oxalate of Calcium. Twelve grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·7°C. P. 44. R. 12.

8th.—The general condition of the animal is unchanged. Temp. A.M. 37·3°C. P. 44. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38°C. Urine, turbid, viscid, greenish-yellow in colour, Sp. Gr. 1,052, alkaline, contains no albumen. Twelve grains of Arsenic were administered during the twenty-four hours. Temp. 5 P.M. 37·7°C. P. 40. R. 16.

9th.—The animal presents a bright appearance; the pulse is weak and easily compressible, otherwise its condition is satisfactory. Temp. A.M. 37·6°C. P. 48. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·4°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,032, alkaline, contains no albumen. Twelve grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38°C. P. 40. R. 12.

10th.—The condition of the animal is unchanged. Temp. A.M. 37°C. P. 48. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·1°C. Urine, turbid, viscid, greenish-yellow in colour, Sp. Gr. 1,038, alkaline, contains no albumen, but numerous Carbonate and Oxalate crystals. Twelve grains of Arsenic were given during the day. Temp. 5 P.M. 38·2°C. P. 44. R. 12.

11th.—The condition of the animal is unchanged. Temp. A.M. 37·8°C. P. 36. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38°C. Urine, turbid, viscid, greenish-yellow in colour, Sp. Gr. 1,036, alkaline, contains no albumen, but crystals of Carbonates and Oxalates. Twelve grains of Arsenic were given during the day. Temp. 5 P.M. 38·4°C. P. 44. R. 16.

12th.—The animal presents a very bright appearance. There is no sign of œdema on the under-surface of the abdomen or sheath and the limbs are fine. Temp. A.M. 37·2°C. P. 44. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·2°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,036, contains no albumen, but numerous crystals of Carbonates and Oxalates. Twelve grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·4°C. P. 44. R. 16.

13th.—The general condition of the animal is unchanged. Temp. A.M. 37·7°C. P. 36. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·6°C. Urine, turbid, viscid, greenish-yellow in colour, Sp. Gr. 1,038, alkaline, contains no albumen. Twelve grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 37·8°C. P. 40. R. 12.

14th.—The general condition of the animal remains unchanged. Temp. A.M. 37·6°C. P. 36. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·2°C. Urine, turbid, viscid, greenish-yellow in colour, Sp. Gr. 1,034, alkaline, contains no albumen. Twelve grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 37·8°C. P. 40. R. 12.

15th.—The general condition of the animal is unchanged. Temp. A.M. 37·6°C. P. 40. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·7°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,036, alkaline, no albumen. Twelve grains of Arsenic were administered during the day. Temp. 5 P.M. 38°C. P. 48. R. 12.

16th.—The animal presents a bright and lively appearance. The visible mucous membranes are clean. There are no petechiæ on the conjunctivæ. The pulse is healthy in character and frequency. The respirations are normal. There is no swelling or œdema of the sheath, under-surface of the abdomen or extremities. The appetite is very good and the evacuations healthy in appearance. Temp. A.M. 37·6°C. P. 40. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·8°C. Urine, turbid, viscid, yellow in colour Sp. Gr. 1,046, alkaline, contains no albumen. Twelve grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38°C. P. 52. R. 20.

17th.—The condition of the animal is unchanged. Temp. A.M. 37·6°C. P. 40. R. 16. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·4°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,042, alkaline, contains no albumen. Twelve grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 37·8°C. P. 48. R. 16.

18th.—The general condition of the animal is not quite so satisfactory as yesterday, although the only symptom is a slight œdema of the sheath. The conjunctivæ are free from petechiæ, and there is no sign of swelling or œdema about the extremities. Temp. A.M. 37·3°C. P. 36. R. 16. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·8°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,036, alkaline, contains no albumen. Twelve grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·1°C. P. 44. R. 28.

19th.—Condition unchanged. Temp. A.M. 37·4°C. P. 40. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·7°C. Urine, turbid, viscid, greenish-yellow in colour, Sp. Gr. 1,046, alkaline, contains no albumen, no Phosphates, Carbonate crystals only, no casts. Twelve grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 37·8°C. P. 40. R. 16.

20th.—Condition unchanged. Temp. A.M. 37·4°C. P. 40. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·6°C. Urine, turbid, greenish-yellow in colour, Sp. Gr. 1,050, alkaline, contains no albumen, no phosphates, Carbonate crystals only; no casts. Twelve grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 37·7°C. P. 40. R. 16.

21*st.*—Condition unchanged. Temp. A.M. 37·5°C. P. 36. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·3°C. Urine, turbid, viscid, greenish in colour, Sp. Gr. 1,042, alkaline, contains neither albumen, phosphates, nor casts; Carbonate crystals only. Twelve grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 37·5°C P. 36. R. 12. Exercised morning and evening.

22*nd.*—Condition unchanged. Temp. A.M. 37·3°C. P. 32. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·4°C. Urine, turbid, viscid, greenish-yellow in colour, Sp. Gr. 1,048, alkaline, contains no albumen, Carbonate crystals only. Ten grains of Arsenic were given during the twenty-four hours. Exercised morning and evening. Temp. 5 P.M. 37·8°C. P. 36. R. 16.

23*rd.*—Condition unchanged. Temp. A.M. 37·5°C. P. 36. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·6°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,048, alkaline, contains no albumen. Ten grains of Arsenic were given during the twenty-four hours. Exercised morning and evening. Temp. 5 P.M. 37·4°C. P. 40. R. 12.

24*th.*—Condition unchanged. Temp. A.M. 37·4°C. P. 40. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·8° C. No urine was collected. Eight grains of Arsenic were given during the twenty-four hours. Exercised morning and evening. Temp. 5 P.M. 38°C. P. 36. R. 16.

25*th.*—The condition of the animal continues to be satisfactory. Membranes clean, absence of œdema. Pulse strong and regular—32. Respirations tranquil—12. Appetite good. Temp. A.M. 37·1°C. The hæmatozoon is absent from the blood. The red corpuscles, form healthy rouleaux, the white are not increased. Temp. 1 P.M. 37·4°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,034, alkaline, contains no albumen, but Carbonate crystals. Seven grains of Arsenic were given during the day. Exercised as usual, morning and evening. Temp. 5 P.M. 37·5°C. P. 40. R. 16.

26*th.*—Condition unchanged. Temp. A.M. 37·5°C. P. 28. R. 16. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·7°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,040, alkaline, contains no albumen. Seven grains of Arsenic were given during the day. The animal was exercised in the morning and evening. Temp. 5 P.M. 38·1°C. P. 44. R. 20.

27*th.*—The animal presents a bright and lively appearance. The visible mucous membranes are clean and the conjunctivæ are devoid of any petechiæ, but are somewhat injected owing to the Arsenic. The limbs are fine and there is a complete absence of œdema from the abdomen and sheath. The pulse is regular, but the beat is small and of somewhat high tension—36. Respirations tranquil—12. The appetite is excellent and the evacuations normal in character. Temp. A.M. 37·2°C. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·4°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,042, alkaline, few Carbonate of Lime crystals. Seven grains of Arsenic were given during the twenty-four hours. The animal was exercised in the morning and evening. Temp. 5 P.M. 38·1°C. P. 36 R. 16.

28*th.*—The general condition of the animal is unchanged. Temp. A.M. 37·4°C. P. 32. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·6°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,040, alkaline, contains no albumen. Six grains of Arsenic were given during the twenty-four hours. The animal was exercised in the morning and evening. Temp. 5 P.M. 37·7°C. P. 36. R. 12.

29*th.*—The general condition of the animal is unchanged. Temp. A.M. 37·5°C. P. 36. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·7°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,050, alkaline, contains no albumen. Six grains of Arsenic were given during the twenty-four hours. The animal was exercised in the morning and evening. Temp. 5 P.M. 37·6°C. P. 32. R. 16.

30*th.*—The condition of the animal is unchanged. Temp. A.M. 37·6°C. P. 32. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,048, alkaline, contains no albumen. Six grains of Arsenic were given during the twenty-four hours. The animal was exercised in the morning and evening. Temp. 5 P.M. 38·2°C. P. 28. R. 12.

31*st.*—The condition of the animal is unchanged. Temp. A.M. 38°C. P. 32. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·2°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,042, alkaline, contains no albumen. Six grains of Arsenic were given during the twenty-four hours. The animal was exercised in the morning and evening. Temp. 5 P.M. 38·5°C. P. 36. R. 16.

1*st, January* 1893.—The condition of the animal is unchanged. Temp. A.M. 37·6° C. P. 32. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·5°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,042, alkaline, contains no albumen. This evening the animal appears somewhat dull and the medicine has been omitted. Six grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·7°C. P. 32. R. 16.

2nd.—The condition of the animal is unchanged. Temp. A.M. 37·6° C. P. 28. R. 16. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·6°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,046, alkaline, contains no albumen. The morning dose was omitted so that three grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·7°C. P. 32. R. 12.

3rd.—There appears to be no change whatsoever in the animal's general condition. Temp. A.M. 37·6°C. P. 32. R. 12. On microscopical examination of the blood, one hæmatozoon was found in two coverglass specimens. Temp. 1 P.M. 38·4° C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,042, alkaline, contains no albumen. The dose of Arsenic was increased to grs. v twice daily. Temp. 5 P M. 38·8°C. P. 32. R. 12.

4th.—This morning the animal presents a somewhat dull appearance. The visible mucous membranes are tinged a yellow colour and there are a few petechiæ on the conjunctivæ. The pulse is regular—32, and the respirations normal in frequency—12. The appetite is good and the fæces natural in character. Temp. A.M. 38°C. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·8°C. Urine, turbid, viscid, creamy-yellow in colour, Sp. Gr. 1,040, alkaline, contains no albumen. Nine grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·8°C. P. 28. R. 16.

5th.—The animal still remains dull, but is easily roused. The visible mucous membranes now present an orange appearance and there are several large, claret-coloured petechiæ on either conjunctiva and lachrymation is well marked. The pulse is regular—32. Respirations 12. There is no sign of œdema about the extremities or the under-surface of the abdomen. The appetite is excellent. Temp. A.M. 38·7°C. The hæmatozoon is again present in small numbers in the blood. Temp. 1 P.M. 39·7°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,038, alkaline, contains no albumen. Nine grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 39·7°C., P. 36. R. 16.

6th.—The animal steadily holds its own and has not perceptibly lost flesh during the past few days. The condition of the membranes is unchanged. The frequency of the pulse has slightly increased since yesterday—40. Respirations 12. The appetite continues to be very good. Temp. A.M. 39·5°C. The hæmatozoa are few in the blood. Temp. 1 P.M. 40·1°C. Urine, turbid, viscid, orange-yellow in colour, Sp. Gr. 1,036, alkaline, contains no albumen. Ten grains of Arsenic were given during the twenty-four hours. Exercise stopped. Temp. 5 P.M. 39·8°C. P. 40. R. 12. At 5-30 P.M. an Urticarial rash limited in extent broke out, fairly marked on either side of the neck and shoulders, but particularly so on the inner side of the thighs and perineal region. The individual patches are exceedingly distinct, the largest being one inch in length by 3/5″ in breadth, ovoid in form and raised; the smallest the size of a two-anna piece.

7th.—The animal is distinctly brighter this morning; no sign of the eruption is visible. The membranes continue to present an orange colour, but the conjunctivæ are free from petechiæ, although lachrymation is still present. The pulse is regular—32. R. 16. The appetite is very good. Temp. A.M. 39·2°C. The hæmatozoon is absent from the blood. Temp. 1 P.M. 39·7°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,038, alkaline, contains no albumen. Ten grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 39·8°C. P. 32. R. 12.

8th.—The condition of the animal is unchanged. Temp. A.M. 39·3°C. P. 28. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 39·4°C. Urine, turbid, viscid, orange-yellow in colour, Sp. Gr. 1,046, alkaline, contains no albumen. Ten grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 39·4°C. P. 36. R. 12.

9th.—The condition of the animal is unchanged. Temp. A.M. 39.1°C. P. 36. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 39·5°C. Urine, turbid, viscid, greenish-yellow in colour, Sp. Gr. 1,044, alkaline, contains no albumen. Ten grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 39·2°C. P. 36. R. 12.

10th.—The animal presents a somewhat dull appearance. The visible mucous membranes still retain the yellow tinge, but there are no conjunctival petechiæ. Lachrymation is present and the conjunctival membranes somewhat red and injected owing to the effect of the Arsenic. There is, however, no sign of œdema about the limbs or abdomen, and the animal is not losing condition. The pulse is regular and the breathing normal in character and frequency. Temp. A.M. 39°C. P. 32. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 39·7°C. Urine, turbid, viscid, orange-yellow in colour, Sp. Gr. 1,036, alkaline, contains no albumen. Ten grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 39·6°C. P. 40. R. 12.

11th.—The condition of the animal is unchanged. Temp. A.M. 38·6°C. P. 32 R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 39°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,040, alkaline, contains no albumen. Eleven grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 39·5°C. P. 32. R. 12. The animal was exercised in the morning and evening.

12th.—The condition of the animal is unchanged. Temp. A.M. 38·7°C. P. 32. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 39·5°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,040, alkaline, contains no albumen. Eleven grains of Arsenic were given during the twenty-four hours. The animal was exercised in the morning and evening. Temp. 5 P.M. 40°C. P. 36. R. 12.

13th.—The condition of the animal is unchanged. Temp. A.M. 39°C. P. 28. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 39·8°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,042, alkaline, contains no albumen. Twelve grains of Arsenic were given during the twenty-four hours. The animal was exercised in the morning and evening. Temp. 5 P.M. 40°C. P. 36. R. 12.

14th.—The animal presents a brighter appearance. The visible mucous membranes are still tinged yellow, but there are no conjunctival petechiæ. The excessive lachrymation has ceased. The extremities, &c., are free from œdema and the animal's general condition is improving. The pulse is strong and regular and the respirations are normal in character. The appetite is very good and the evacuations natural in character. Temp. A.M. 39°C. P. 32. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 39·6°C. Urine, turbid, viscid, orange-yellow in colour, Sp. Gr. 1,032, alkaline, contains no albumen. Thirteen grains of Arsenic were given during the twenty-four hours. The animal was exercised in the morning and evening. Temp. 5 P.M. 39·5°C. P. 32. R. 16.

15th.—The condition of the animal is unchanged. Temp. A.M. 38·7°C. P. 28. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 39·3°C. Urine, turbid, viscid, orange-yellow in colour, Sp. Gr. 1,030, alkaline, contains no albumen. Thirteen grains of Arsenic were given during the twenty-four hours. The animal was exercised in the morning and evening. Temp. 5 P.M. 39·7°C. P. 40. R. 12.

16th.—The condition of the animal is unchanged. Temp. A.M. 38·4°C. P. 36. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 39·2°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,040, alkaline, contains no albumen. Twelve grains of Arsenic were given during the twenty-four hours. The animal was exercised in the morning and evening. Temp. 5 P.M. 39·5°C. P. 32. R. 12.

17th.—The condition of the animal is unchanged. Temp. A.M. 38·6°C. P. 28 R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 39·2°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,040, alkaline, no albumen. Eleven grains of Arsenic were given during the twenty-four hours. The animal was exercised in the morning and evening. Temp. 5 P.M. 39·2°C. P. 36. R. 16.

18th.—The condition of the animal is unchanged. Temp. A.M. 38°C. P. 24. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·5°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,040, alkaline, contains no albumen. Eleven grains of Arsenic were given during the twenty-four hours. The animal was exercised in the morning and evening. Temp. 5 P.M. 39·2°C. P. 32. R. 12.

19th.—The condition of the animal is unchanged. Temp. A.M. 38°C. P. 40. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·5°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,038, alkaline, contains no albumen. Eleven grains of Arsenic were given during the twenty-four hours. The animal was exercised in the morning and evening. Temp. 5 P.M. 38·8°C. P. 28. R. 12.

20th.—The condition of the animal is unchanged. Temp. A.M. 37·8°C. P. 28. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·5°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,042, alkaline, contains no albumen. Ten grains of Arsenic were given during the twenty-four hours. The animal was exercised in the morning and evening. Temp. 5 P.M. 39·3°C. P. 36. R. 12.

21st.—The animal presents a very dull appearance this morning. It stands still in one position with the head hanging down, the eyes closed and lachrymation is excessive. The visible mucous membranes are tinged a faint yellow colour, but there is an absence of petechiæ. The pulse is strong and regular and the breathing tranquil. The appetite is fairly good. Temp. A.M. 38·6°C. P. 28. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·8°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,038, alkaline, contains no albumen. The animal took very little water to drink and consequently only five grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 39°C. P. 28. R. 12.

22nd.—The condition of the animal is unchanged. Temp. A.M. 38°C. P. 28. R. 12. The hæmatozoa are few in the blood. Temp. 1 P.M. 38·1°C. Urine, turbid, viscid, bright yellow in colour, Sp. Gr. 1,028, alkaline, contains no albumen. Five grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 36·8°C. P. 28. R. 12.

23rd.—The condition of the animal is unchanged. Temp. A.M. 38°C. P. 36. R. 12. The hæmatozoa are numerous in the blood. Temp. 1 P.M. 38·5°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,024, alkaline, contains no albumen. This morning the animal has not taken water, so that it did not receive any Arsenic. In the evening Quinine two grains were administered. Temp. 5 P.M. 39·1°C. P. 32. R. 16

24th.—The animal still continues to present a dull appearance. The visible mucous membranes are yellow in colour. There are large bright red petechiæ invading the membranæ nictitantes, and excessive lachrymation is still present. The pulse is normal as regards frequency, but is full and hard. The appetite is good. Temp. A.M. 38·2°C. P. 32. R. 12. The hæmatozoa are few in the blood. Temp. 1 P.M. 38·6°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,042, alkaline, contains no albumen. Ten grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·4°C. P. 32. R. 16.

25th.—The condition of the animal is unchanged. Temp. A.M. 37·5°C. P. 32. R. 12. The hæmatozoa are numerous in the blood. Temp. 1 P.M. 37·8°C. Urine not collected. Ten grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·3°C., P. 32. R. 12.

26th.—The animal continues to present a dull appearance and stands with its head in a corner of the stable, resting it against the wall for support. It now takes nothing to eat, but readily drinks milk when given to it. There appears to be some slight weakness of the right hind limb, as the animal avoids placing its weight on it, but on examination there is no tenderness on pressure. There is a total absence of swelling and œdema from the under-surface of the abdomen and extremities. Temp. A.M. 37·5°C. P. 32. R. 16. The hæmatozoa are very numerous in the blood. Temp. 1 P.M. 37·7°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,050, alkaline, contains no albumen. Ten grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·2°C. P. 32. R. 12.

27th.—The condition of the animal has become aggravated, the dull appearance has become more marked, and the lips are swollen and œdematous from the dependent position of the head, which hangs lower than it did yesterday. The animal supports itself mainly upon the right fore and hind limbs, as there appears to be some weakness in those of the left side. When made to move its position, the near hind limb slides forward so that the foot is situated between the fore-feet, and it with difficulty staggers forward. Temp. A.M. 37·2°C. P. 40. R. 16. The hæmatozoa are very numerous in the blood. Temp. 1 P.M. 37·6°C. Urine passed, but none collected. No Arsenic was given to the animal. Temp. 5 P.M. 38·5°C. P. 36. R. 16.

28th.—This morning the animal stands with its head hanging down to within ten inches of the ground which is turned to the right, the neck at the same time being considerably arched. The weight of the body is supported by the right fore and hind limbs. It can move about the loose box, but with a reeling and staggering gait, the near hind foot slipping forward between the fore-limbs as mentioned yesterday. At times, without otherwise changing its position, it crosses the front legs, the left foot being carried across the right. When pressure is exercised over the lumbar regions, the animal at first appears as if about to collapse entirely, but immediately afterwards assumes a position in which the hind limbs are found to be resting on the extreme anterior edges of the hoofs. When fluid is placed before the animal, it moves its lips about in it, but does not attempt to swallow, and the same may be said when grass is placed in its mouth; the jaws are moved gently, but there appears to be no strength to masticate.

The visible mucous membranes retain their yellow colour and there are a few bright-red conjunctival petechiæ. The pulse is normal in point of frequency—32, but weak; the breathing is tranquil, respirations 12. Temp. A.M. 36·7°C. There are a few hæmatozoa in the blood. Temp. 1 P.M. 38·5°C. No urine was passed during the twenty-four hours. No medicine was administered, but two seers of milk were given in the morning and two in the afternoon. Temp. 5 P.M. 37·8°C. P. 36. R. 12.

29th.—The condition of the animal is unchanged. Temp. A.M. 37·6° C., P. 36, R. 12. There are a few hæmatozoa in the blood. Temp. 1 P.M. 37·6° C. No urine was passed during the twenty-four hours. Two seers of milk were given in the morning and two again in the evening. Temp. 5 P.M. 38·5° C. P. 36. R. 12.

30th.—The animal appears somewhat stronger; the head still hangs down, but it is not turned to the right as previously. The animal stands for a time and then assumes the recumbent position; it can, however, get up without assistance. The appetite has entirely failed and the only nourishment taken is the milk administered thrice daily. Temp. A.M. 35·8°C. P. 32. R. 12. The hæmatozoa are numerous in the blood. Temp. 1 P.M. 36·8°C. No urine has been passed for seventy-two hours. Temp. 5 P.M. 37·7°C. P. 40. R. 16.

31st.—As there is no improvement in the animal's condition this morning, the temperature being 35°C., P. 32, R. 12, it is decided to give Chloroform in excess. Consequently at 12-30 P.M., $CHCl_3$ was administered to the animal and death took place at 12-37 P.M.

AUTOPSY at 1 P.M. The body is somewhat emaciated. There is a complete absence of swelling and œdema from the under-surface of the abdomen and extremities.

On section all the tissues of the body are stained an orange colour.

Thorax.—There is no fluid in pleural cavities and there are no pleuritic adhesions.

Lungs.—Both organs are the seat of localized emphysema at the apices and along the anterior inferior borders. There are a few small, somewhat circular, sub-pleural extravasations of blood dotted over both lungs, more especially on the inner surfaces and along the inferior borders. *On section* the tissues present a healthy appearance, except at the seats of emphysematous change.

The cavity of the *pericardium* contains 4 ozs. of a turbid, orange-coloured fluid.

Heart.—Is enlarged and weighs 6 lbs. ½ oz. There is no deposit of jelly-like exudation round the base, and the external surface of the organ is free from sub-pericardial ecchymoses. The right side of the heart is dilated, the left side being in a condition of semi-contraction.

On section.—The cavities on the *right side* of the heart are filled with dark fluid blood, the endocardial lining of both is stained a yellow colour, but there are no sub-endocardial extravasations. The tricuspid and pulmonary valves present a healthy appearance.

The cavities on the *left side* are empty; the endocardial linings are also stained yellow in colour, but there are no sub-endocardial extravasations. The mitral and aortic valves present a healthy appearance.

Abdominal cavity.—Is free from fluid.

Liver.—Is normal in size and weighs 10 lbs. 4 ozs. The anterior surface presents signs of old perihepatitis, but there are no sub-capsular petechiæ or calcareous bodies.

On section.—Dark fluid blood exudes from the cut surfaces of the organ, but the tissues present a healthy appearance.

Spleen.—Is large, double the normal weight, 3 lbs. 8½ ozs. There are a few dark brick-red coloured extravasations under the capsule.

On section the tissues are exceedingly firm and present an appearance somewhat resembling an amyloid change to the naked eye.

Kidneys.—The right weighs 1 lb. 5½ ozs., the left 1 lb. 3 ozs. The capsules strip easily, and the external cortical portions present a normal appearance. *On section,* the cortical portion is somewhat dark in colour, and the medullary portion streaked red and white, but nothing pathological can be made out macroscopically.

Stomach.—Is very small and contracted. *On section,* a small amount of semi-digested grass was found in its cavity.

The walls of the *cuticular portion* are exceedingly thick, and the internal coat presents a lobulated appearance made up of small elevations rounded on their summits and of a bright yellow colour.

The *villous portion* is stained a greenish-yellow colour, mottled a pinkish red on its surface, and the internal coat is deeply corrugated. On stretching the organ, the tissues at the bottom of the sulci between the rugæ are deeply congested and present a dark red colour, but there is no ulceration or solution of continuity of the superficial mucous membrane. At the fundus of the organ involving the villous portion, one inch from the line of demarcation between it and the cuticular portion, is a "*Spiroptera*" tumor, the size of a small hen's egg, whilst on the surface of the mucous membrane covering it are a few of the small species.

Small Intestines.—Almost the entire length of the gut presents more or less injected appearance, and there is one small patch measuring 2″ × 1·5″ in the *ileum* raised eight feet from the ileo-cæcal valve, which presents circular extravasations of blood, of a dark reddish-purple colour, varying in diameter from one-sixth to one-third of an inch. Peyer's patches are somewhat swollen and œdematous, but there is no sign of ulceration.

Large Intestines.—*Cæcum* presents one deeply congested patch of 5″ × 4·5″ in extent, but here also there is no sign of ulceration. *Colon* and *Rectum* present a healthy appearance.

Brain.—The membranes present a healthy appearance. The superficial veins are congested, but, *on section,* nothing pathological is observable. The lateral ventricles are free from fluid.

Bladder.—Presents a healthy appearance and contains 70 ozs. of orange-coloured urine; Sp. Gr. 1,024, acid in re-action, which contains no albumen, a few epithelial and granular casts, together with a small number of free red blood corpuscles.

Crystals.—Carbonate of Calcium a few, Oxalate of Calcium numerous small ones, large orange-coloured crystals of Uric Acid assuming several different forms.

Remarks.—This animal, a Persian Gelding, aged 13 years, was purchased on 26th November 1886. It was attacked with fever on 20th November 1892, but the hæmatozoon was not discovered in the blood until the 27th. During the six years which elapsed between the date of purchase and appearance of the disease the animal had good health.

On admission to the Laboratory Hospital on the morning of the 29th the animal was in very good condition, but on examination the visible mucous membranes were found to be tinged a yellow colour, but there were no conjunctival petechiæ present. The temperature was 39·2°C. The pulse was hard, frequent 56, and dicrotous, and the respirations were increased in frequency, 24 per minute. On microscopical examination of the blood, numerous hæmatozoa were observed. By mid-day the temperature had risen to 40·3°C., but it had again fallen to 39·1°C. by 5 P.M., and half an hour later an eruption of Urticaria was sparsely scattered over the body, which commenced to fade each evening but reappeared each morning until the 3rd December. On the morning of the 30th the temperature had fallen to 38·6°C., P. 52, and the respirations from 28 the previous evening to 12 per minute, the organisms being very numerous in the blood, the urine however was not collected. On this day the animal was placed upon an Arsenical treatment consisting of the full physiological dose to begin with, viz., gr. iv bis die. This was continued for two days, when it was increased to gr. v bis die. On the morning of the 7th day of the disease a natural intermission took place most probably, for the hæmatozoon was absent from the blood and remained so until the 10th day, when a few were found on microscopical examination. This proved but an abortive attempt on the part of the hæmatozoon, for on the following day only a few were again observed, and on the 8th December, the 12th day, none could be seen; thus proving that the Arsenic was taking effect. From this latter date until the evening of January 1st, 1893, the 36th of the disease, the temperature never rose above 38·7°C. and for the greater part of the time was below 38°C. The hæmatozoon had been absent from the general circulation for a period of twenty-five days and the animal presented a very satisfactory appearance. Consequently the treatment was discontinued on that evening, and on the morning of the following day, but was again exhibited on the evening of the latter day. On the 3rd January, the 38th day, the organism again made its appearance in the blood. Temp. 37·6°C., P. 32, R. 12, and although absent on the 39th day, was present in small numbers on the 40th and 41st days, when a well marked crop of Urticaria again appeared, but faded the same evening. The temperature had by this time risen and registered at mid-day, January 6th, 40·1°C., and for the next fifteen days, 42nd—56th inclusive, during which the hæmatozoon was again absent, the temperature oscillated between 40°C. and 37·8°C., the pulse and respirations remaining within normal limits. At the expiration of this second intermission, the animal again presented a dull appearance, head hanging, eyes closed, excessive lachrymation, very little water was taken although the appetite was fairly good, and on the 22nd January, the 57th day of the disease, the organism was again recognized in the blood, and continued present during the ten days that the animal lived. Numerous and obscure symptoms presented themselves which were put down to cerebral pressure, as on several occasions an increased quantity of fluid had been found in the lateral ventricles of the brain at the Autopsy. This was, however, found not to be the case; the brain presented a healthy appearance, the chief lesion being found located in the stomach, which organ was exceedingly contracted and the mucous membrane of the villous portion deeply injected. During the last week the animal was kept alive upon milk, which it drank readily for the first few days, but later it had to be administered at stated intervals.

It is a point of clinical interest that during the whole course of this case, which lasted sixty-six days, albumen was only found in the urine in small quantities, viz., 1/40th and a trace on the 5th and 19th days of the disease respectively. Water was absolutely refused on the three days previous to death, and during the same period no urine was passed. But the secretion removed from the bladder one hour *post-mortem* was found on examination to contain a few epithelial and granular casts, a small number of red blood corpuscles, together with numerous crystals of Uric Acid and Oxalates, and a few Carbonate of Calcium crystals.

RECORDS OF URINE.

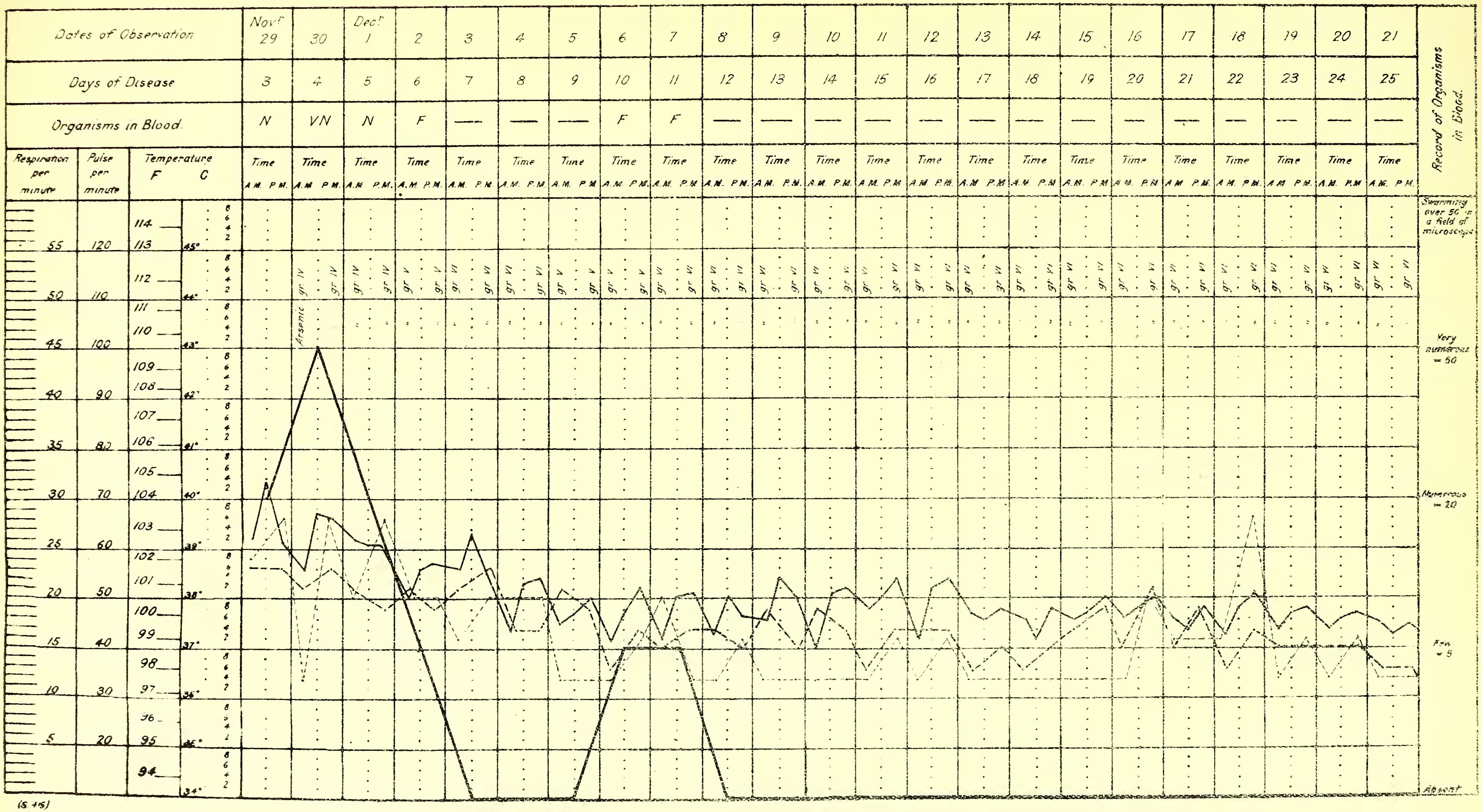
Animal—Bay Australian Gelding, No. LXXVII. Date, 27th November 1892.
Disease—Naturally contracted Surra.

Date.	Quantity.	Colour.	Re-action.	Sp. Gravity.	Albumen.	Phosphates.	Remarks.
1892.							
Decr. 1st	...	Turbid, viscid, orange	Alkaline	1,030	1/40th	Nil	Carbonates and oxalates of calcium.
,, 2nd	...	Do. do.	Do.	1,036	Nil	Nil	,, ,, ,,
,, 3rd	...	Do. do.	Do.	1,040	Nil	Nil	,, ,, ,,
,, 4th	...	Do. do,	Do.	1,038	Nil	Nil	,, ,, ,,
,, 5th	...	Turbid, viscid, yellow	Do.	1,040	Nil	Nil	,, ,, ,,
6th	...	Turbid, viscid, orange	Do,	1,037	Nil	Nil	,, ,, ,,
7th	...	Turbid, viscid, greenish yellow.	Do.	1,040	Nil	Nil	,, ,, ,,
8th	...	Do. do.	Do.	1,052	Nil	Nil	,, ,, ,,
9th	...	Turbid, viscid, yellow	Do.	1,032	Nil	Nil	,, ,, ,,
10th	...	Turbid, viscid, greenish yellow.	Do.	1,038	Nil	Nil	,, ,, ,,
11th	...	Do. do.	Do.	1,036	Nil	Nil	Numerous carbonates and oxalate crystals.

Date.		Quantity.	Colour.	Re-action.	Specific Gravity.	Albumen.	Phosphates.	Remarks.
1892.								
December	12th...	......	Turbid, viscid. orange...	Alkaline ...	1,036	Nil ...	Nil ...	Numerous carbonates and oxalate crystals.
,,	13th...	......	Turbid, viscid, yellowish green.	Do. ...	1,038	Nil ...	Nil ...	No casts; carbonate crystals only.
,,	14th...	......	Turbid, viscid, greenish yellow.	Do. ...	1,034	Nil ...	Nil ...	,, ,, ,,
,,	15th...	......	Turbid, viscid, yellow...	Do. ...	1,036	A trace ...	Nil ...	,, ,, ,,
,,	16th...	......	Do. do. ..	Do. ...	1,046	Nil ...	Nil ...	,, ,, ,,
,,	17th...	......	Do. do. ...	Do. ...	1,042	Nil ...	Nil ...	,, ,, ,,
,,	18th...	......	Do. do. ...	Do. ...	1,036	Nil ...	Nil ...	,, ,, ,,
,,	19th...	......	Turbid, viscid, greenish yellow.	Do. ...	1,046	Nil ..	Nil ...	,, ,, ,,
,,	20th...	......	Turbid, greenish yellow.	Do. ...	1,050	Nil ...	Nil ...	,, ,, ,,
,,	21st...	......	Turbid, viscid, greenish	Do. ...	1,042	Nil ...	Nil ...	,, ,, ,,
,,	22nd...	......	Turbid, viscid, greenish yellow.	Do. ...	1,048	Nil ...	Nil ...	,, ,, ,,
,,	23rd...	......	Turbid, viscid, yellow...	Do. ...	1,048	Nil ...	Nil ...	,, ,, ,,
,,	24th...	... ..	None collected.	..	...	...	...	
,,	25th...	......	Turbid, viscid, yellow...	Do. ..	1,034	Nil ...	Nil ...	,, ,, ,,
,,	26th...	......	Do. do. ...	Do. ...	1,040	Nil ...	Nil ...	,, ,, ,,
,,	27th...	......	Do. do. ...	Do. ...	1,042	Nil ...	Nil ...	,, ,, ,,
,,	28th...	.....	Do. do. ...	Do. ...	1,040	Nil ...	Nil ...	,, ,, ,,
,,	29th...	......	Do. do. ...	Do. ...	1,050	Nil ...	Nil ...	,, ,, ,,
,,	30th...	......	Do. do. ...	Do. ...	1,048	Nil ...	Nil ...	,, ,, ,,
,,	31st...	......	Do. do. ...	Do. ...	1,042	Nil ...	Nil ...	,, ,, ,,
1893.								
January	1st ...	......	Turbid, viscid, yellow...	Alkaline ...	1,042	Nil ...	Nil ...	No casts, carbonate crystals only.
,,	2nd...	......	Do. do. ...	Do. ...	1,046	Nil ...	Nil ...	,, ,, ,,
,,	3rd ...	......	Do. do. ...	Do. ...	1,042	Nil ...	Nil ...	Calcium carbonates, no oxalates and no casts.
,,	4th...	......	Turbid, viscid, creamy yellow.	Do. ...	1,040	Nil ...	Nil ...	,, ,, ,,
,,	5th...	......	Turbid, viscid, yellow...	Do. ...	1,038	Nil ...	Nil ...	,, ,, ,,
,,	6th...	......	Turbid, viscid, orange yellow.	Do. ...	1,036	Nil ...	Nil ...	,, ,, ,,
,,	7th...	......	Turbid, viscid, orange...	Do. ...	1,038	Nil ...	Nil ...	,, ,, ,,
,,	8th...	......	Turbid, viscid, orange yellow.	Do. ...	1,046	Nil ...	Nil ...	,, ,, ,,
,,	9th...	......	Turbid, viscid, greenish yellow.	Do. ...	1,044	Nil ...	Nil ...	,, ,, ,,
,,	10th...	......	Turbid, viscid, orange yellow.	Do. ...	1,036	Nil ...	Nil ...	,, ,, ,,
,,	11th...	......	Turbid, viscid, yellow...	Do. ...	1,040	Nil ...	Nil ...	Numerous calcium carbonate and a few oxalate crystals.
,,	12th...	......	Do. do. ..	Do. ...	1,040	Nil ...	Nil ...	,, ,, ,,
,,	13th...	......	Turbid, viscid, orange...	Do. ...	1,042	Nil ...	Nil ...	,, ,, ,,
,,	14th...	......	Do. do. ...	Do. ...	1,032	Nil ...	Nil ...	,, ,, ,,
,,	15th...	......	Turbid, viscid, orange yellow.	Do. ...	1,030	Nil ...	Nil ...	,, ,, ,,
,,	16th...	......	Turbid, viscid, orange...	Do. ...	1,040	Nil ...	Nil ...	,, ,, ,,
,,	17th...	......	Do. do. ...	Do. ...	1,040	Nil ...	Nil ...	,, ,, ,,
,,	18th...	......	Turbid, viscid, yellow...	Do. ...	1,040	Nil ...	Nil ...	,, ,, ,,
,,	19th...	......	Turbid, viscid, orange...	Do. ...	1,038	Nil ...	Nil ...	,, ,, ,,
,,	20th...	......	Do. do. ...	Do. ...	1,042	Nil ...	Nil ...	,, ,, ,,
,,	21st ...	......	Do. do. ...	Do. ...	1,038	Nil ...	Nil ...	,, ,, ,,
,,	22nd...	......	Turbid, viscid, bright yellow.	Do, ...	1,028	Nil ...	Nil ...	,, ,, ,,
,,	23rd...	......	Turbid, viscid, yellow...	Do. ...	1,024	Nil ...	Nil ...	Calcium carbonate crystals, and a few oxalate crystals.
,,	24th...	......	Turbid, viscid, orange...	Do. ...	1,042	Nil ...	Nil ...	,, ,, ,,
,,	25th...	......	None collected	......	...	......	...	
,,	26th...	......	Turbid, viscid, yellow ...	Alkaline ...	1,050	Nil ...	Nil ...	Carbonate of calcium numerous and a few oxalate crystals.
,,	27th...	......	Urine passed, but none	collected.				
,,	28th...	......	No urine; passed during	the twenty-f	our ho u	rs.		
,,	29th...	......	Do. do. ...	do.				
,,	30th...	......	Do. do. ...	do.				
,,	31st...	......	Turbid, orange	Acid ...	1,024	Nil ...	Nil ...	The urine removed from the bladder *post-mortem* contained a few epithelial and granular casts, also a small number of free red blood corpuscles, a few carbonate of lime and numerous small oxalate crystals; also several varieties of uric acid, including bundles of dark coloured needle crystals of different lengths and thicknesses.

Bay Australian Gelding ——— Age, 13. ——— Sex, Gelding ——— Colour, Bay.

Disease, "Surra" naturally contracted ——— Date of Attack, 27. 11. 1892 ——— Result, Death ——— Date of Result, 31. 1. 93. ——— Register No: LXXVII.



(S. 45)

Hæmatozoon curve ———
Temperature ———

Drawn & Litho: Govt. Photozinco: Office Poona 1893

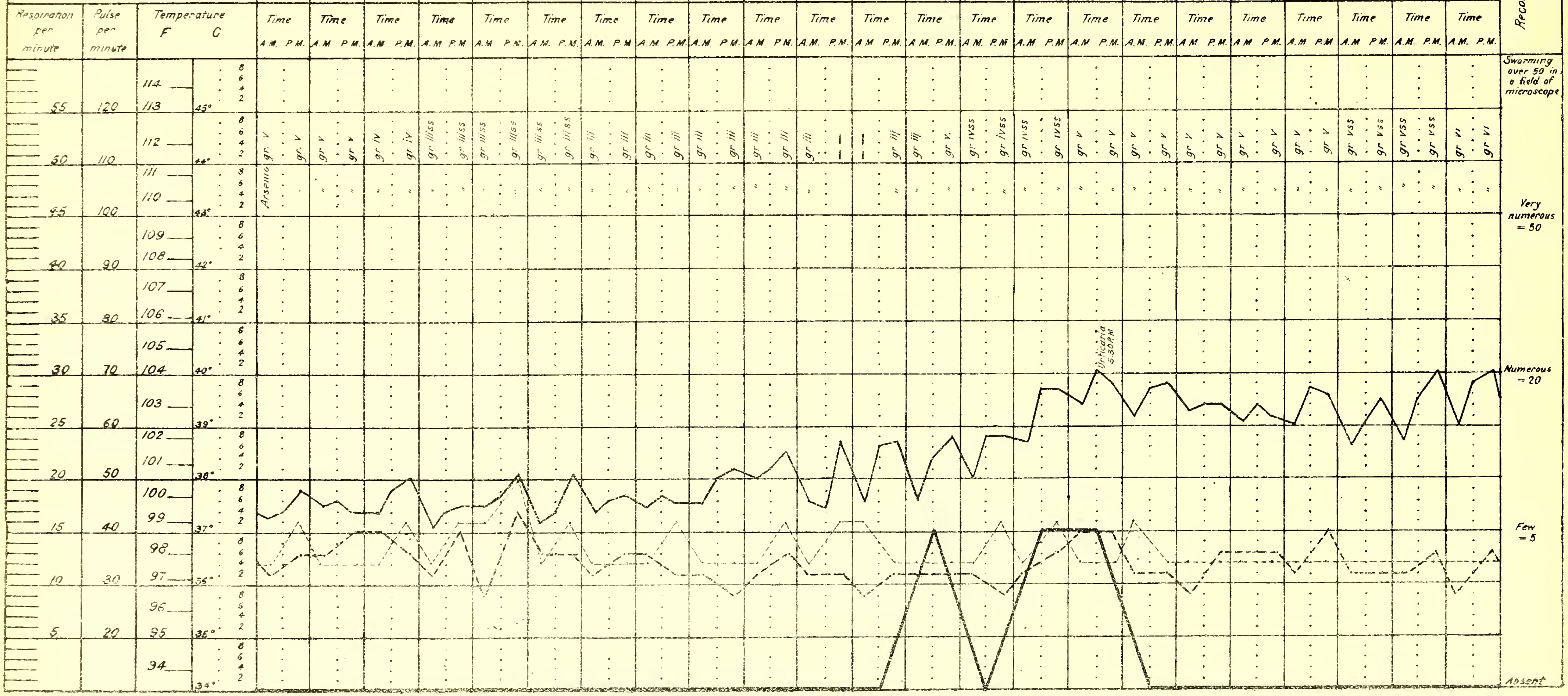
Pulse. — — — —
Respiration - - - - -

Age ———— Sex ———— Colour

Age ______ Sex ______ Colour ______

Disease ______ Date of ______ Result ______ Date of Result ______ Register No. LXXVII. ______

Dates of Observation.	Dec.r 22	23	24	25	26	27	28	29	30	31	1893 Jan.y 1	2	3	4	5	6	7	8	9	10	11	12	13
Days of Disease	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
Organisms in Blood.	—	—	—	—	—	—	—	—	—	—	—	—	F	—	F	F	—	—	—	—	—	—	—
Time	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.
Arsenic	gr. v gr. v	gr v gr v	gr iv gr iv	gr iiiss gr iiiss	gr iiiss gr iiiss	gr iii ss gr iii ss	gr iii gr iii	gr iii gr iii	gr iii gr iii	gr iii gr iii	gr iii —	— gr iij	gr iij gr v.	gr ivss gr ivss	gr ivss gr ivss	gr v gr v	gr v gr v	gr v gr v	gr v gr v	gr v gr v	gr vss gr vss	gr vss gr vss	gr vi gr vi



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Drawn & Litho Govt Photozinco Office Poona 1893

RECORD OF TEMPERATURE, PULSE AND RESPIRATION

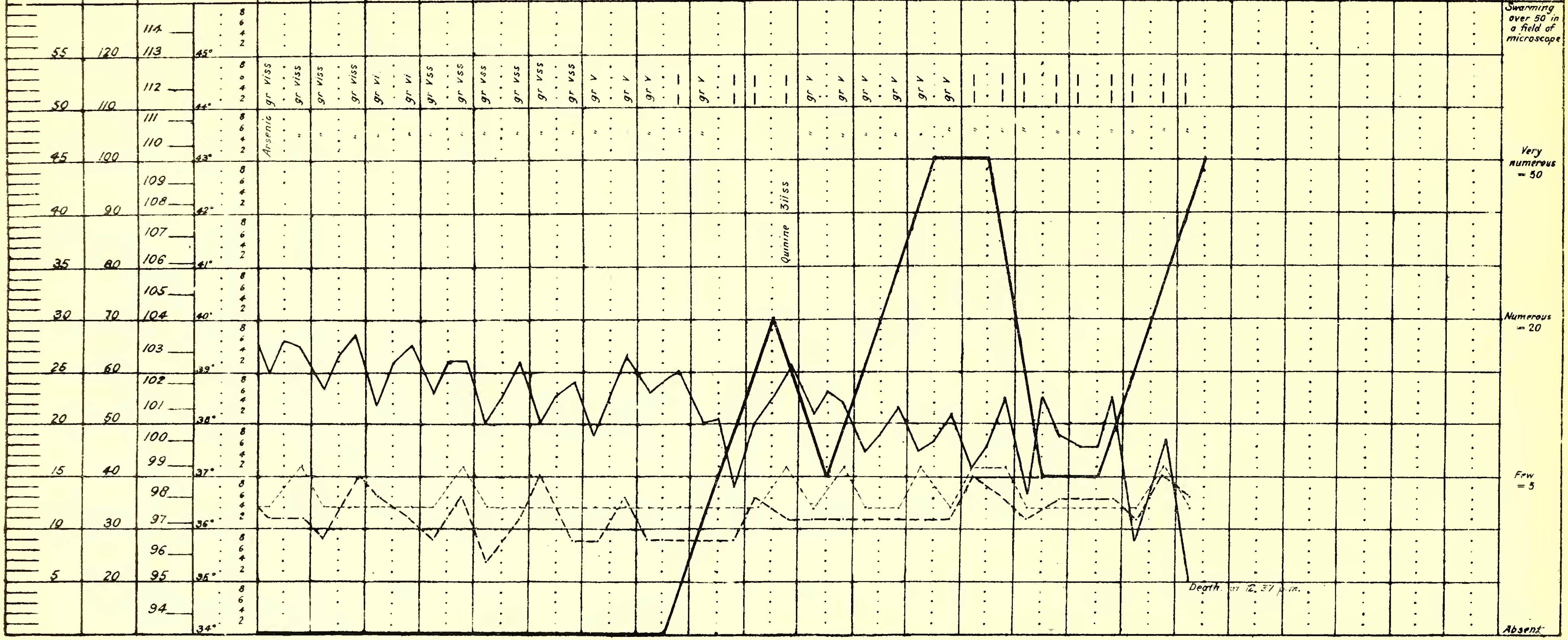
Age ______ Sex ______ Colour ______

Age ______ Sex ______ Colour ______

Disease ______ Date of ______ Result ______ Date of Result ______ Register No. LXXVII. ______

Dates of Observation.	Jan.y 14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31					
Days of Disease	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66					
Organisms in Blood.	—	—	—	—	—	—	—	—	F	N	F	N	VN	VN	F	F	N	VN					
	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.
Arsenic	gr viss gr viss	gr viss gr viss	gr vi gr vi	gr vss gr vss	gr vss gr vss	gr vss gr vss	gr v gr v	gr v —	gr v —	— —	gr v gr v	gr v gr v	gr v gr v	— —	— —	— —	— —	— —					

Quinine 3iiss



(S. 415)

Hæmatozoon curve ————
Temperature .... ————

Drawn & Litho Govt Photozinco: Office Poona 1893.

Pulse .... - - - - - - -
Respiration .... - - - - - - -

CASE No. LXXVIII.—GREY AUSTRALIAN MARE. *Age 9 years.* Belonging to the Bombay Tramway Company (No. 448).

This animal was purchased on January 23rd, 1890. On December 2nd, 1892, it was observed to be ailing and was taken into the Infirmary at Parel, when the temperature was found to be—

Temperature A.M. 38·6°C. P. 48. Temperature P.M. 37·4°C. P. 40.

3rd December 1892...Temp. A.M. 37·2°C. P. 40. Temp. P.M. 37·2°C. P. 40.
4th „ ... „ „ 37·2°C. P. 40. „ „ 37·2°C. P. 36.
5th „ ... „ „ 37·7°C. P. 40. „ „ 38·3°C. P. 44.
6th „ ... „ „ 38·7°C. P. 48. „ „ 39·3°C. P. 52.

On this date the hæmatozoon was discovered on examination of the blood.

7th December 1892—8 A.M. Arrived at the Laboratory Hospital.

On Admission.—The animal presents a fairly bright appearance. The visible mucous membranes are tinged a slight yellow colour, but the conjunctivæ are free from petechiæ There is slight swelling and œdema of the extremities, which is principally localized to the fetlocks. The pulse is frequent 52, but regular; the vessel is somewhat small, the pulsation weak and its access gradual it is also easily compressible. The respirations are normal in frequency and character—16 per minute. The appetite is good and the fæces present a healthy appearance. Temp. A.M. 38·7°C. The hæmatozoa are swarming in the blood. Temp. 1 P. M. 39·4°C. No urine was collected. Four grains of Arsenic were given in water in the evening. Temp. 5 P.M. 39°C. P. 52. R. 32.

8th.—The general condition of the animal is unchanged. Temp. A.M. 38·5°C. P. 52. R. 20. There are very numerous hæmatozoa in the blood. Temp. 1 P.M. 39·4°C. Urine, clear, viscid, orange in colour, Sp. Gr. 1,019, alkaline, contains a trace of albumen and crystals of Carbonate and Oxalate of Calcium. Eight grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 39·5°C. P. 60. R. 32.

9th.—The animal presents a somewhat dull appearance; the visible mucous membranes are tinged a yellow colour, but there are no petechiæ on the conjunctivæ. The pulse is weak and thready, but regular. The appetite is fairly good and the evacuations. natural in character. Temp. A.M. 39·1°C. P. 56. R. 16. The hæmatozoa are few in the blood. Temp. 1 P.M. 39·3°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,016, alkaline; contains no albumen, but a few Carbonate and Oxalate crystals.. Ten grains of Arsenic were given in water during the twenty-four hours.

Temp. 5 P.M. 39°C. P. 56. R. 36.

10th.—The condition of the animal has slightly improved. At 9 A.M. one large *ascaris megalocephala* was passed with the dung and an hour later several small parasites came away. The appetite has improved since yesterday. Temp. A.M. 38·3°C. P. 52. R. 16. The hæmatozoa are numerous in the blood. Temp. 1 P.M. 39·2°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,020, alkaline, contains no albumen, but a few Carbonate and Oxalate crystals. Ten grains of Arsenic were given during the day. Temp. 5 P.M. 40·1°C. P. 56. R. 16.

11th.—The condition of the animal is unchanged. Temp. A.M. 39·2°C. P. 56. R. 16. The hæmatozoon is absent from the blood. Temp. 1 P.M. 39·6°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,024, neutral, contains no albumen or casts, Carbonate and Oxalate crystals. Twelve grains of Arsenic were given during the day. Temp. 5 P.M. 41°C. P. 64. R. 20.

12th.—This morning the animal appears to have improved somewhat in condition. The visible mucous membranes are clean. There are no fresh petechiæ. The pulse is strong and regular and the respirations normal in frequency. Temp. A.M. 40°C. P. 64. R. 16. The hæmatozoon is absent from the blood. Temp. 1 P.M. 40·2°C. No urine was collected. Twelve grains of Arsenic were given in the twenty-four hours. Temp. 5 P.M. 41°C. P. 64. R. 20.

13th.—The condition of the animal is unchanged. Temp. A.M. 39·6C. P. 56. R. 20. The hæmatozoon is absent from the blood. Temp. 1 P.M. 39·5°C. Urine not collected. Twelve grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 39·4°C. P. 60. R. 20.

14th.—The animal presents a bright appearance. The visible mucous membranes are slightly injected, but there are no petechiæ on the conjunctivæ. The pulse is strong and regular, but not forcible by any means. The respirations are normal. The appetite is good. Temp. A.M. 39°C. P. 56. R. 16. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·5°C. No urine was collected. Twelve grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 39·4°C. P. 64. R. 16.

15th.—The animal has developed a cough during the night, but the skin does not feel hot. The pulse is 60 and the respirations 16. Nothing is to be heard over the chest by auscultation. Temp. A.M. 39°C. The hæmatozoon is absent from the blood. Temp. 1 P.M. 39·7°C. No urine was collected. Twelve grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 40·3°C. P. 60. R. 16.

16th.—The cough has still further developed and troubles the animal when it holds its head in the dependent position. The visible mucous membranes appear slightly injected, as also the conjunctivæ, but there are no petechiæ visible. The pulse is frequent; the vessel feels hard under the finger, but it is easily compressible. The breathing is tranquil, but the breath smells exceedingly offensive. There is a muco-purulent discharge from the nostrils, especially the right. The appetite has somewhat fallen off. Temp. A.M. 39·5°C. P. 64. R. 20. The hæmatozoon is absent from the blood. Temp. 1 P.M. 39·5°C. P. 84. No urine was collected. Twelve grains of Arsenic were administered during the twenty-four hours. Temp. 5 P.M. 39·7°C. P. 72. R. 24.

17th.—The animal presents a somewhat dull appearance and the cough continues to be troublesome; but although the temperature is 39·6°C., the skin does not feel hot. The visible mucous membranes appear the same as yesterday, but this morning there are two petechiæ on the membrana nictitans of the left eye and a large one on that of the right. The pulse is still frequent, 64, but of low tension. The respirations are normal in character and frequency, 16 per minute. The hæmatozoon is absent from the blood. Temp. 1 P.M. 39·3°C. Urine, none passed. Twelve grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 40·6°C. P. 64. R. 16. Although the temperature is considerably elevated this evening, the animal does not appear to be any worse. It has eaten its ration of corn, bran, &c., as usual. The breathing is tranquil.

18th.—Death occurred at 2 A.M.

AUTOPSY.—Body emaciated. Hind limbs slightly œdematous.

Thorax.—The right pleural cavity contains sixty ounces of a turbid, yellowish coloured fluid. The external surface of the right lung is adherent to the costal pleura from the first to the seventh rib, and between the two surfaces of the membrane a thin layer of yellow coloured exudation is apparent. There are numerous sub-pleural ecchymoses, dark-purple in colour, dotted over the posterior surface of the organ.

On section the interior lobule is found to be the seat of well marked emphysema which also involves the inferior angle and border. The rest of the organ is undergoing decomposition, but is quite free from consolidation.

The left pleural cavity contains twenty-one ounces of a turbid, yellow coloured fluid. The external surface of the organ from the first to the seventh rib is adherent to the costal pleura, and presents the same changes found in the right and the posterior surface or base is adherent to the corresponding portion of the anterior surface of the diaphragm. The anterior lobule and the anterior half of the organ, when the exudation is stripped off, present a dark purplish-red colour, and are hard to the touch. The posterior portion is dotted over with sub-pleural ecchymoses, circular in form, the largest of which do not exceed $\frac{1}{6}$th of an inch in diameter. *On section*, the anterior half is the seat of consolidation, but the posterior is fully distended with air.

The pericardial sac contains four ounces of a turbid, amber-coloured fluid, but there are no adhesions or signs of pericarditis, although the exterior wall is considerably thickened and the vessels injected.

Heart.—The base is the seat of a certain amount of yellow-coloured exudation, which is freely dotted over with small dark-coloured but circumscribed ecchymoses. The muscular surface of the organ is free from sub-pericardial extravasations, except at the extreme apex, where a patch presents itself, half an inch square, which is made up of small ones, aggregated together.

On section, the right side of the heart is found to contain dark-coloured fluid blood, with a few small dark clots entangled in chordæ tendineæ. The lining membrane of both cavities is blood-stained. The left auricle is empty and presents a normal appearance. The wall of the left ventricle measures $1\frac{7}{8}$th inches at its greatest thickness. There are numerous sub-endocardial extravasations dotted over the whole extent of this cavity, but they are much more numerous on the upper half, although the largest and most extensive hæmorrhages are as usual situated on the surface of the musculi-papillares.

Abdominal Cavity is free from fluid.

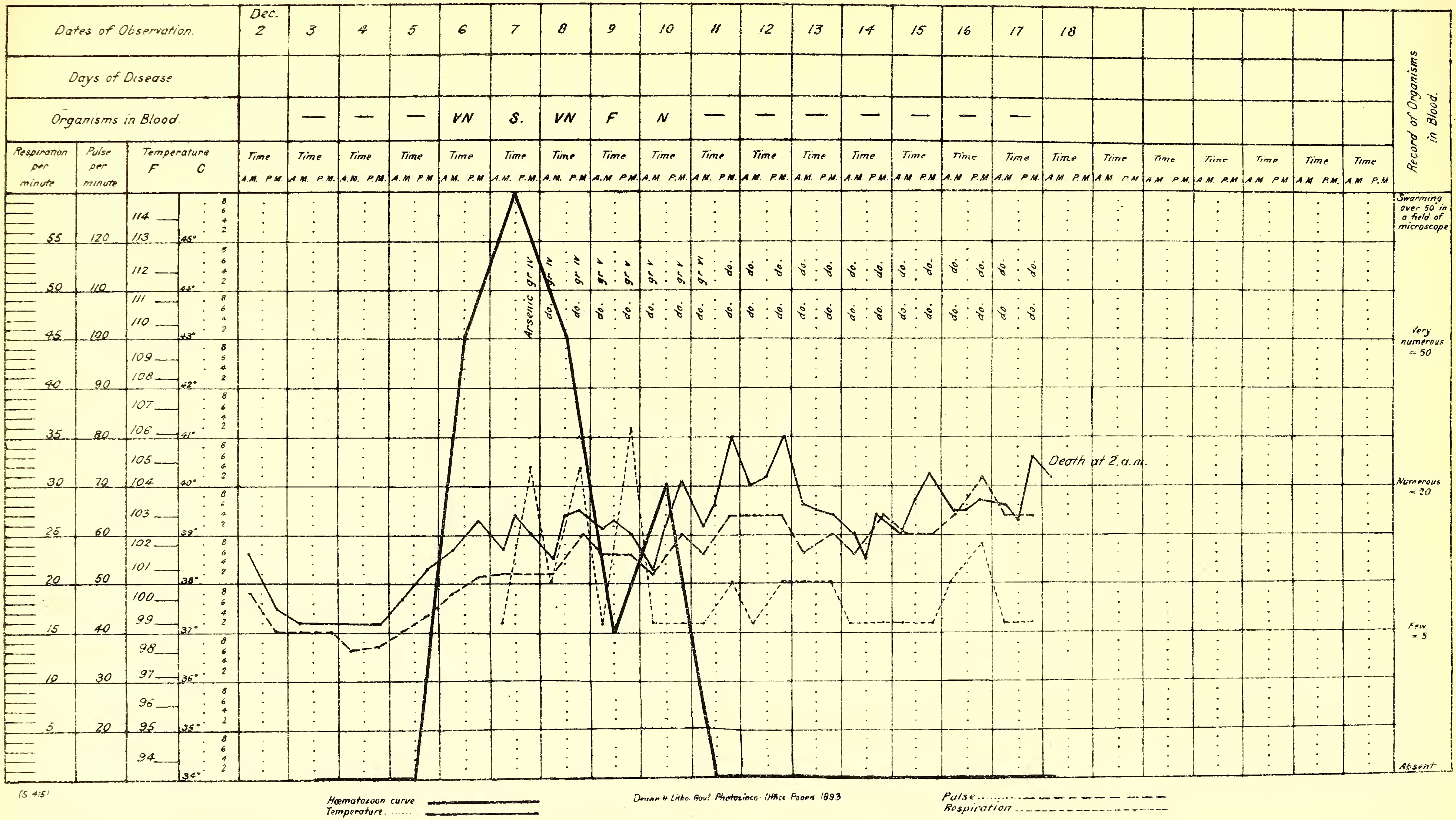
Liver weighs 14 lbs. 7 ozs., is enlarged, and presents signs of old perihepatitis, especially of the surface of the left lobe. *On section,* the organ is found to be full of blood which exudes from the cut ends of the vessels and a section of the tissues resembles a nutmeg in appearance.

Spleen.—Weighs 1 lb. 9½ ozs., is small, but presents very numerous sub-capsular petechiæ of a bright red colour. *On section* the tissue is firm and healthy in appearance.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Australian ____ Age, 9 ____ Sex, Mare ____ Colour ____

Disease, 'Surra' naturally contracted ____ Date of Attack, 2.12.1892. ____ Result, Death ____ Date of Result, 18.12.1892 Register No. LXXVIII ____



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Kidneys.—The right weighs 1 lb. 8½ ozs.; the left 1 lb. 9½ ozs. The capsules strip easily and reveal some injection of the stellate veins, but no petechiæ.

On section.—The cortical portion of the organ presents a congested appearance, the Malpighian corpuscles being red in colour, the medullary portion appears healthy.

Stomach.—The organ is semi-distended. *On section* the *cuticular* portion presents a normal appearance, as also the mucous membrane of the *villous* portion, with this exception that there is a tumor with a hole on its summit, lying on the villous side of the line of demarcation at its most dependent part due to *(spiroptera megastoma).*

The Intestines.—The mucous membrane of the large and small intestines presented a normal appearance.

Remarks.—This animal belonged to the Bombay Tramway Company and was purchased on January 23rd, 1890. Until December 2nd, 1892, it appeared to be in good health, but on that date was observed to be ailing and was taken into the Infirmary at Parel. The temperature at that time was elevated, but fell during the day and remained normal during the two following days. The blood on microscopical examination presented a healthy appearance. On the 5th December the temperature began to rise and steadily continued to do so until the evening of the 6th, when it registered 39·3°C. On this date the hæmatozoon was first discovered in the blood.

The animal was admitted into the Laboratory Hospital on the morning of the 7th. Temperature 39·7°C. It presented a fairly bright appearance, although the symptoms of Surra were well marked and the Trypanosoma were swarming in the blood. On examination of the chart, however, it will be observed that the temperature was falling on December 2nd, and attained a minimum on the morning of the 3rd. Taking this together with the three days' intermission which followed the general condition of the animal, the fact that the visible mucous membranes were tinged yellow, the presence of albumen in the urine, there can be little doubt that at least one paroxysm must have occurred previous to the animal coming under observation. On the evening of the 7th with a temperature of 39°C. P. 52. R. 32. four grains of Arsenic were administered, as from previous experiments this drug was found to have a far less irritating effect on the gastric mucous membrane, when given by itself than in conjunction with the mixed alkaloids and to have if anything a more prompt action on the hæmatozoon when exhibited alone. The following morning the thermometer registered 38·5°C., the respirations had fallen to 20 but the pulse remained the same. The organism had, however, decreased in number in the blood, and there was still a trace of albumen in the urine. During the 9th, the animal presented a somewhat dull appearance. The visible mucous membranes remained yellow in colour, but there were no conjunctival petechiæ present. The hæmatozoa were few in the blood. The dose of Arsenic was increased to grains five bis die. On the morning of the 10th the temperature was 38·3°C. and the hæmatozoa numerous; notwithstanding that the animal showed some slight improvement during the day several ascarides were passed with the dung. The same evening the temperature rose to 40·1°C., but by the following morning had again fallen to 39·2°C. and the organism was absent from the blood. From this time the temperature gradually rose until it attained a maximum of 41°C. at 5 P.M. falling again to 40°C. on the morning of the 12th, but again attaining 41°C. the same evening. On the morning of the 13th the thermometer registered nearly a degree and a half lower than that on the previous evening, and during this day and until mid-day on the 14th continued to fall, attaining a minimum of 38·5°C. On the morning of the 15th the animal had developed a cough and the temperature rose 1·3°C. during the day, but nothing could be made out on auscultation. On the 16th the temperature varied between 39·5°C. and 39·7°C. The cough had become more troublesome, especially when the animal held its head in the dependent position. The same evening the pulse rose to 72 and the respirations 24 per minute. On the morning of the 17th the temperature was 39·6°C., the pulse 64 and the respirations 16. The hæmatozoon had now been absent from the blood for seven days and during that period the animal had taken in its drinking water six grains of Arsenic night and morning. At five o'clock the same evening the temperature registered 40·6°C., the pulse 64, respirations tranquil, 16, but the animal did not appear to be any worse and ate its evening ration of corn and hay. At midnight, however, it became suddenly worse and died at 2 A.M.

RECORDS OF URINE.

Animal—Australian Mare. No. LXXVIII. Date, December 7th, 1892. Disease, Naturally contracted Surra.

Date.	Quantity.	Colour.	Re-action.	Sp. Gravity.	Albumen.	Phosphates.	REMARKS.
1892.							
December 7	...	Turbid, viscid, orange...	Alkaline ...	1,020	A trace.	*Nil.*	Caco$_3$ and Oxalate crystals; no casts.
,, 8	...	Clear, do. ...	Do. .	1,019	Do.	*Nil.*	Do. do.
,, 9	..	Turbid do. ...	Do. ...	1,016	*Nil.*	*Nil.*	Do. do.
,, 10	...	Turbid, viscid, yellow...	Do. ...	1,020	*Nil.*	*Nil.*	Do. do.
,, 11	...	Do. do. ...	Neutral ...	1,024	*Nil.*	*Nil.*	Do. do.
,, 18	...	Death.					

CASE No. LXXIX.—CHESTNUT AUSTRALIAN GELDING. Aged twelve years. This animal belonged to the Bombay Tramway Company and was purchased on 22nd November 1886. It was first noticed to be ill on the 6th December 1892, upon which date he was removed to the Infirmary at Colába Stables, and on microscopical examination of the blood the presence of the hæmatozoon was discovered.

7th December, 8 A.M.—Arrived at the Laboratory Hospital.

On admission.—The animal presents a heavy dull appearance, the head is hanging, the eyes half closed and the coat staring. The extremities are the seat of considerable swelling and œdema, and there is a slight amount present on the under-surface of the abdomen, also involving the sheath. The pulse is fairly strong and regular and the respirations normal. The appetite is poor, but the fæces are normal in character. Temp. A.M. 39·3°C. P. 52. R. 12. The hæmatozoa are swarming in the blood. Temp. 1 P.M. 40·2°C. Urine is clear, viscid, orange in colour, Sp. Gr. 1,025, acid in re-action, and is almost solid with the quantity of albumen, no casts, but a few cells which appear like pus, Carbonates and Oxalates of Calcium. Four grains of Arsenic were given in water in the evening. Temp. 5 P.M. 41·3°C. P. 68. R. 24.

8th.—The general condition of the animal is unchanged. Temp. A.M. 39°C. P. 64. R. 20. There are very numerous hæmatozoa in the blood. Temp. 1 P.M. 39.4°C. Urine, clear, viscid, orange in colour, Sp. Gr. 1,019, alkaline, quite solid with albumen, but there are no casts, a few pus cells and crystals of Carbonate and Oxalate of Calcium. Eight grains of Arsenic were administered during the day. Temperature 5 P.M. 39·5°C. P. 72. R. 36.

9th.—The general condition of the animal is unchanged. The membranes retain the yellow tinge, but there are twelve large claret-coloured petechiæ on the conjunctiva of the left eye the right being free. The pulse is fairly strong like a cord under the finger, but not easily compressible. The appetite is fair and the fæces natural in character. Temp. A.M. 39.1°C. P. 60. R. 16. There are a few hæmatozoa in the blood. Temperature 1 P.M. 39.3°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,018, alkaline, and contains a very large amount of albumen; the whole contents of the test tube after standing eighteen hours are almost solid. Eleven grains of Arsenic were given in water during the day. Temperature 5 P.M 41·3°C. P. 72. R. 20.

10th.—The animal presents a dull and semi-somnolent appearance this morning, standing in one position for a long period, and eating little or nothing. The visible mucous membranes retain the yellow tinge, and there are four large claret-coloured petechiæ involving the conjunctiva covering the membrana nictitans of the right eye. Temperature A.M. 37·3°C. P. 44. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·3°C. Urine, clear, viscid, orange in colour, Sp. Gr. 1,020, alkaline in re-action, contains albumen ¼th, but no casts, pus cells and Carbonate and Oxalate crystals. Twelve grains of Arsenic were given during the day. Temp. 5 P.M. 39·2°C. P. 44 R. 16.

11th.—The condition of the animal is unchanged. Temp. A.M. 38°C. P. 44. R. 16, The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·2°C. Urine, turbid, viscid, greenish-yellow in colour, Sp. Gr. 1,018, alkaline, contains no casts or albumen, a few Carbonate and Oxalate crystals. Twelve grains of Arsenic were administered during the 24 hours. Temp. 5 P. M. 38·5°C. P. 52. R. 20.

12th.—The animal presents a brighter appearance. The visible mucous membranes are clean. The conjunctivæ are free from petechiæ, but that of the left eye is congested. Temp. A.M 38·2°C. P. 48. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 39·4°C. No urine was collected. Twelve grains of Arsenic were given during the day, Temp. 5 P.M. 40·3°C. P. 64. R. 16.

13th.—The condition of the animal is unchanged. Temp. A.M. 38·2°C. P. 52. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·3°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,028, contains albumen ⅓rd, no casts, Carbonate and a few Oxalate crystals. Twelve grains of Arsenic were given during the twenty-four hours. Temp. 5 P. M. 39·1°C. P. 64. R. 16.

14th.—The animal appears dull and semi-somnolent. There are fresh petechiæ on the conjunctivæ and a slight serous discharge from the nostrils. The appetite remains good. Temp. A M. 37·6°C. P. 60. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·3°C. No urine was collected. Twelve grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 39.3°C. P. 64. R. 16.

15th.—The condition of the animal is unchanged. Temp. A.M. 37·7°C. P. 60. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P. M. 38·6°C. No urine was collected. Twelve grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 39·3°C. P. 64. R. 16.

16th.—The animal still presents a dull appearance. The visible mucous membranes are slightly injected as also the conjunctivæ. There are two petechiæ invading the membrana nictitans of the right eye and one in the left. The pulse feels like a cord under the finger, its beat is forcible. The respirations are healthy. There is a discharge of clear straw coloured fluid from the nostrils and the animal developed a cough at midday. There is swelling and œdema of right fore-limb, which is now almost twice the circumference of the left, and there is also swelling and œdema of the sheath and fetlocks of the hind limbs. There is paralysis of the *sphincter ani* and the bowel is patent. Temp. A.M. 37·8°C. P. 56. R. 20. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·6°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,020, contains albumen $\frac{1}{6}$th. Twelve grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·6°C. P. 60. R. 20.

17th.—The animal's condition is unchanged. Temp. A.M. 37·7°C. P. 56. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·3°C. Urine, turbid, viscid, greenish-yellow in colour, Sp. Gr. 1,016, alkaline, contains albumen $\frac{1}{9}$th, a few epithelial casts and a few red blood corpuscles. Twelve grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 37·8°C. P. 64. R. 16.

18th.—The animal if any thing presents a more miserable appearance than previously. There are six fresh petechiæ involving the conjunctivæ of the left eye and two in the right. The pulse is frequent, 60, the beat is somewhat forcible and abrupt, but of low tension. The breathing is tranquil, 16. The discharge from the nostrils has ceased. The appetite is poor and since 8 A.M. the animal has only passed per anum small quantities of a faintly yellow coloured, frothy mucus, but no fæcal matter. Temp. A.M. 37·5°C. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·5°C. Urine, turbid, viscid, yellow, Sp. Gr. 1,020, alkaline, contains albumen $\frac{1}{3}$rd, a few epithelial casts together with some red-blood corpuscles. Twelve grains of Arsenic were administered during the twenty-four hours. Temp. 5 P.M. 38·4°C. P. 68. R. 40.

19th.—The condition of the animal is unchanged. The appetite for grass is poor, although the animal has eaten its corn. Temp. A.M. 36·8°C. P. 60. R. 24. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·5°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,022, alkaline, contains $\frac{1}{8}$th albumen. Twelve grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·7°C. P. 72. R. 20.

20th.—The general condition of the animal is unchanged. Temp. A.M. 37·4°C. P. 60. R. 20. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·1°C. Urine, turbid, viscid, greenish-orange in colour, Sp. Gr. 1,052, alkaline, contains albumen $\frac{1}{6}$th and a few granular casts. Twelve grains of Arsenic were given during the twenty-four hours.Temp. 5 P.M. 38·4°C. P. 60. R. 20.

21st.—The animal is weaker than he has been previously, and the loss of condition is becoming more marked every day. The visible mucous membranes are tinged an amber colour. There are ten large petechiæ on the right conjunctiva and four on that in the left. The pulse is regular but forcible and the tension high. The appetite is poor. Temp. A.M. 37·6°C. P. 64. R. 16. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·5°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,020, alkaline, contains albumen $\frac{1}{12}$th, granular and blood casts and a few crystals. Twelve grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 37·6°C. P. 72. R. 24.

22nd.—The general condition of the animal is less satisfactory this morning and the weakness is more marked. Temp. A.M. 39·3°C. P. 64. R. 32. The hæmatozoon is absent from the blood. Temp. 1 P.M. 39·6°C. Urine, turbid, viscid, dark-brown in colour Sp. Gr. 1,024, alkaline, contains $\frac{1}{12}$th albumen together with numerous granular casts, pus cells, Carbonate and Oxalate crystals. Ten grains of Arsenic were given during the day. Temp. 5 P.M. 39·6°C. P. 80. R. 40.

Death occurred somewhat suddenly this evening at seven o'clock.

AUTOPSY.—Body emaciated, some swelling and œdema of the hind limbs, sheath and under-surface of the abdomen.

Thorax.—The pleural cavities each contains about forty ounces of an orange-coloured fluid, but there are no pleuritic adhesions. The trachea is stained orange and its inner surface is the seat of numerous patches of congestion. As death took place somewhat suddenly, the pulmonary arteries were examined for clots, but no sign of one having become dislogded could be discovered in their ramifications.

The surfaces of the *lungs* are dotted over with small sub-pleural ecchymoses, circular in form and dark-purple in colour. There is some slight localized emphysema at the apices and free borders. The organs are well distended with air, and *on section*, with the exception that the cut surfaces present a marbled pink and yellow colour, the tissues present a healthy appearance.

The pericardial sac contains two ounces of a turbid, amber-coloured fluid.

Heart is very large and weighs 8 lbs. 4½ ounces. The base is the seat of a considerable amount of orange-coloured exudation, dotted over with a few sub-pericardial extravasations, which are, however, absent from the muscular structure. *On section*, the *right auricle* contains a few dark clots, but the endocardial lining is pale and free from ecchymoses. The *right ventricle*.—The walls are somewhat hypertrophied and the cavity contains bright orange-coloured blood clots. The upper portion of the walls is the seat of a few dark sub-endocardial extravasations; these are surrounded by a lighter-coloured red zone. The valves are healthy. *Left auricle* presents a healthy appearance. *Left ventricle*.—The walls are hypertrophied, but with the exception of a few bright orange-coloured blood clots, its cavity is empty. The upper half is the seat of extensive, dark-coloured sub-endocardial extravasations which are particularly well marked behind the chordæ tendineæ and on the portion of the structure lying under the bicuspid curtains. The upper portion of both musculi-papillares also presents the same changes.

The *abdominal cavity* is free from fluid.

Liver weighs 14 lbs. 11 ozs., is enlarged. The right lobe is the seat of old perihepatitis, but the left is free and presents a healthy appearance.

On section the tissues appear fairly normal.

Spleen weighs 2 lbs. ½ oz. The organ is normal in size, but the surface of the capsule appears pale, with the exception of a few dark purple-coloured petechiæ.

Kidneys.—Right weighs 1 lb. 15½ ozs. and the left 2 lbs. 3 ozs. Both organs are tinged yellow, the capsules strip easily and reveal very large numbers of small red-coloured spots, the size of a small pin's head covering the whole external surface, but *on section* they do not appear to involve the deeper structures.

The *Stomach*.—*On section* the organ is somewhat distended with semi-digested food. The *cuticular* portion is healthy in appearance, and the *villous* also, with the exception that there is a tumor (*Spiroptera megastoma*) invading the structure of the mucous membrane of the latter portion, lying close up to the line of demarcation.

The *small intestines* present a few small patches of congestion, but no ulceration.

Cæcum, perfectly healthy in appearance.

Colon.—There are large patches invading the mucous membrane, red in colour, highly congested but no sign of ulceration or free blood in the lumen of the tube.

Rectum.—Here also there are a few small purple-coloured petechiæ but no ulceration.

Bladder.—Empty. *On section*, some of the vessels lying under the mucous membrane are injected. At the fundus of the organ there is a patch of extravasation measuring ½″ × ½″, dark purple in colour, due to the presence of blood beneath the lining membrane.

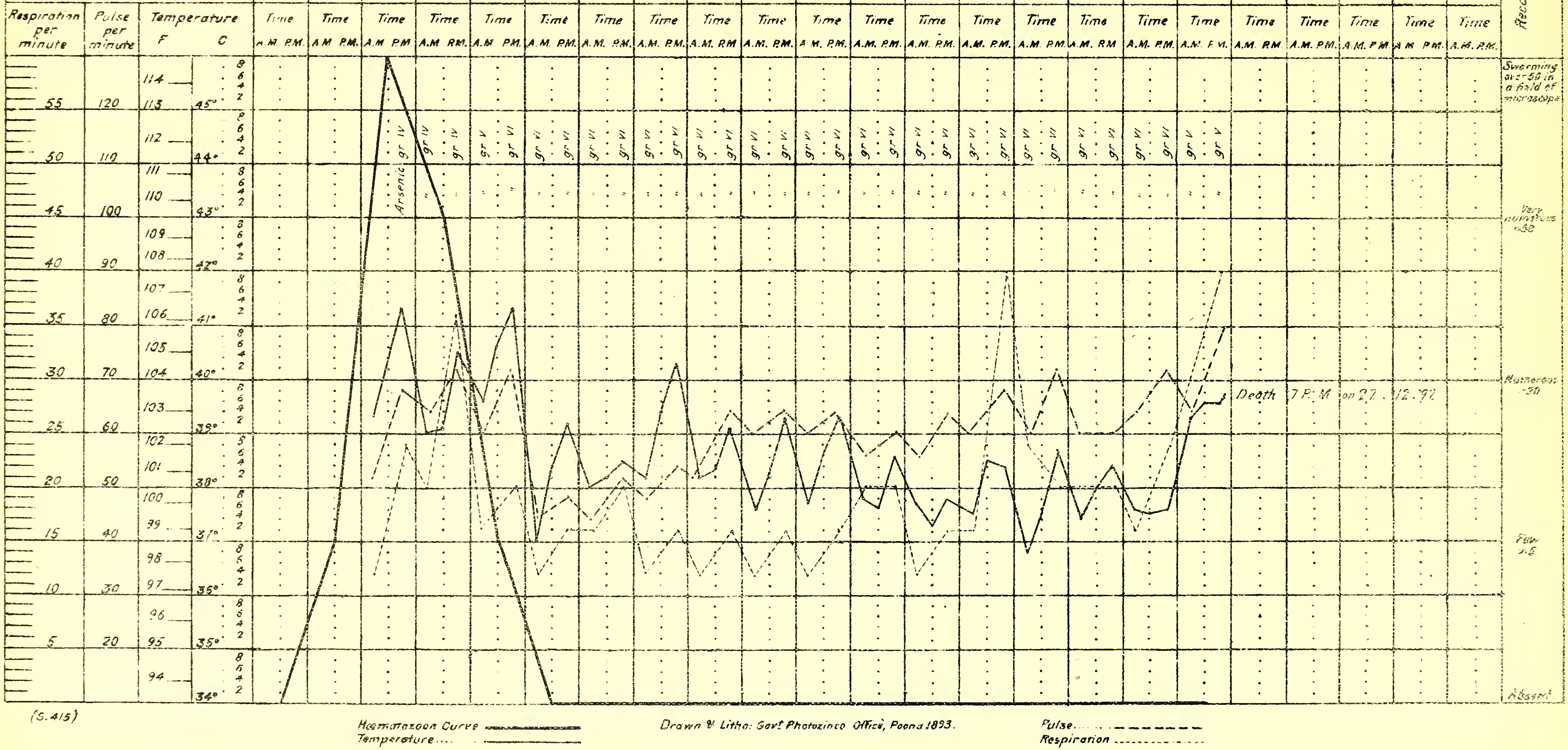
No *parasites* have been observed in the entire length of the intestinal tract although carefully looked for.

Remarks.—This animal, an Australian Gelding, aged twelve years, belonged to the Bombay Tramway Company, and was purchased in November 1886. On the 6th December 1892, it was first noticed to be ill and was at once removed into the Infirmary at the Colaba Stables, and on microscopical examination of the blood the Surra hæmatozoon was discovered. On admission to the Laboratory Hospital on the morning of the 7th, the animal presented advanced symptoms of the disease, *viz.*, a heavy, dull and semi-somnolent appearance, head hanging, eyes half closed, coat staring, considerable swelling and œdema of the extremities, sheath and under-surface of the abdomen. The urine acid, and almost solid owing to the presence of albumen, and the blood swarming with hæmatozoa. The same evening the temperature registered 41·3°C., P. 68, R. 24, and the treatment was at once commenced, four grains of Arsenic being given with the drinking water. On the morning of the 8th, the temperature had fallen over two degrees, but the pulse and respirations still remained high. The hæmatozoa were numerous in the blood. The same evening the thermometer registered 40·5°C. P. 72. R. 33. The Arsenic was repeated. On the morning of the 9th, the condition of the animal was unchanged. Temp. 39·6°C. P. 60. The respirations had, however, fallen to 16 per minute and the hæmatozoa were few in the blood. At 5 P.M. the same evening, the temperature was 41·3°C. P. 72. R. 20. The dose of Arsenic was increased to grains six bis die. During the night a remarkable fall in the temperature took place 4·3°C. (7·7°F.). The pulse registered 44 and the respirations 12 per minute, and the hæmatozoon had disappeared from the blood. At the same time the urine, which was solid on the day previous, now contained only ¼th albumen. The temperature rose again in the evening a little over two degrees, but the pulse and respirations were but slightly increased. During a period of thirteen days the hæmatozoon remained absent until death occurred on the 22nd December. The condition of the animal was unchanged. The temperature was marked by morning remissions and evening exacerbations and oscillated between 40·3°C. and 36·8°C. until the evening of the day previous to death, when it gradually rose and attained a maximum of 39·6°C. P. 80. R. 40. The Arsenic was continued throughout this period, and the albumen varied from ½ to ⅑th, no casts were observed on microscopical examination until the 17th December, when a few epithelial and blood casts were discovered, followed later by granular ones.

Australian ______ Age, 12 ______ Sex, Gelding ______ Colour, Chestnut ______

Disease, "Surra" naturally contracted ______ Date of Attack, 6.12.1892 ______ Result, Death ______ Date of Result, 22.12.92 Register No. LXXIX ______

Dates of Observation.	Decr 5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22						Record of Organisms in Blood.
Days of Disease		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17						
Organisms in Blood.		F	S	VN	F	—	—	—	—	—	—	—	—	—	—	—	—	—						



(S.415)

Drawn & Litho: Govt Photozinco Office, Poona 1893.

RECORDS OF URINE.

Animal, Australian Chestnut Gelding, No. LXXIX. Date, December 7th, 1892.
Disease, naturally contracted "Surra".

Date.	Quantity.	Colour.	Re-action.	Specific Gravity.	Albumen.	Phosphates.	REMARKS.
1892.							
December 7th ...	...	Turbid, viscid, orange.	Alkaline ...	1,025	Solid albumen.	Nil ...	No casts, a few pus cells, carbonates and oxalates.
,, 8th ...	...	Clear, viscid, orange.	Do. ...	1,016	Solid ...	Nil ...	Do. do.
,, 9th ...	...	Turbid, viscid, orange.	Do. ...	1,018	Do. ...	Nil ...	Do. do.
,, 10th ...	...	Clear, viscid, orange.	Do. ...	1,020	¼ ...	Nil ...	Do. do.
,, 11th ...	...	Turbid, viscid, orange.	Do. ...	1,018	⅓ ...	Nil ...	No casts, carbonates and a few oxalates.
,, 13th ...	...	Turbid, viscid, yellow.	Do. ...	1,028	⅓ ...	Nil ...	Do. do.
,, 16th ...	...	Do.	Do. ...	1,020	⅙ ...	Nil ...	Do. do.
,, 17th ...	...	Turbid, viscid, greenish-yellow.	Do. ...	1,016	⅕ ...	Nil ...	Epithelial and blood casts, carbonates and a few oxalates.
,, 18th ...	...	Turbid, viscid, yellow.	Do. ...	1,020	⅓ ...	Nil ...	Do. do.
,, 19th ...	...	Do.	Do.	1,022	⅛ ...	Nil ...	Do. do.
,, 20th ...	...	Turbid, viscid, greenish-orange.	Do. ...	1,052	⅙ ...	Nil ...	Do. do.
,, 21st ...	...	Turbid, viscid, orange.	Do. ...	1,020	½ ...	Nil ...	Do. do.
,, 22nd ...	...	Turbid, viscid, dark-brown.	Do. ...	1,024	½ ...	Nil ...	Granular casts, numerous pus cells, calcium carbonate crystals, no oxalates.

CASE No. LXXX.—AUSTRALIAN BAY MARE, *(No. 370) aged 11 years,* belonging to the Bombay Tramway Company, was purchased on the 22nd November 1886. During the six years which elapsed, the animal was only eleven days in the Hospital, until she was taken in on the 5th December 1892, viz.:—

In 1889, 4 days in Hospital with fever.
„ 1890, 4 „ colic.
„ 1891, 1 „ off its feed.
„ 1892, 2 „ „

11*th December.*—Arrived at the Laboratory Hospital. *On admission.*—The animal presents a heavy, dull appearance, but not nearly so marked as in the case of No. LXXIX. The extremities are somewhat œdematous, and there are two folds running from between the fore-legs to behind the shoulders, also the seat of considerable exudation. There is a slight eruption of Urticaria visible on the neck, belly and hind limbs. The visible mucous membranes are faintly tinged a yellow colour, and there are several petechiæ on the right membrana nictitans, but the left is free from them. The pulse is fairly strong and regular, but the vessel feels somewhat hard under the finger. The breathing is tranquil and the respirations normal in point of frequency. The appetite is good and the evacuations healthy in character. Temp. A.M. 39°C. P. 64 R. 20. The hæmatozoa are very numerous in the blood. Temp. 1 P.M. 40·6°C. Urine, turbid, viscid, orange, Sp. Gr. 1,022, alkaline, contains no albumen or casts but a number of Carbonate but no Oxalate crystals. Four grains of Arsenic were given in the drinking water in the evening. Temp. 5 P.M. 40·5°C. P. 76. R. 28.

12*th.*—The animal presents a somewhat dull appearance this morning, but all signs of the eruption have disappeared. The visible mucous membranes are tinged a pale yellow colour. There are numerous large claret-coloured petechiæ, invading the membranæ nictitantes. The pulse continues frequent, but is fairly strong and regular. The breathing is tranquil, and the respirations normal in number. The œdema has not increased in amount since yesterday. The appetite is good and the fæces natural in character. Temp. A.M. 39·1°C. P. 48. R. 16. The hæmatozoa are few in the blood. Temp. 1 P.M. 39·2°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,018, acid, contains no albumen but a few crystals of Carbonates and Oxalates. Eight grains of Arsenic were administered during the twenty-four hours. Temp. 5 P.M. 38·7°C. P. 44. R. 28.

13*th.*—The condition of the animal has somewhat improved, it presents a brighter appearance, the œdema has not increased on the under-surface of the chest, the petechiæ on the conjunctival membranes are fading and no fresh ones have made their appearance. The pulse is fairly strong and regular. Temp. A.M. 38·2°C. P. 40. R. 16. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·6°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,026, acid and contains no albumen. Eight grains of Arsenic were administered. Temp. 5 P.M. 37·7°C. P. 44. R. 20.

14*th.*—The condition of the animal is unchanged. Temp A.M. 38°C. P. 40. R. 16. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·5°C. Urine, turbid, viscid orange in colour, Sp. Gr. 1,032, alkaline contains no albumen. Ten grains of Arsenic were administered. Temp. 5 P.M. 38·4°C. P. 44. R. 28.

15*th.*—The condition of the animal is unchanged. Temp. A.M. 37·5°C. P. 44. R. 16. The hæmatozoon is absent from the blood. Tem. 1 P.M. 38·3°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,040, alkaline, contains no albumen. Ten grains of Arsenic were administered during the twenty-four hours. Temp. 5 P.M. 38·6°C. P. 52. R. 20.

16*th.*—The appearance of the animal has improved, but there are fresh and extensive petechiæ invading the conjunctival membranes, bright red in colour. The pulse beat is fairly strong, but easily compressible and markedly dicrotous. The œdema has increased a little in amount between the fore-limbs, but the extremities are free from swelling and œdema. Temp. A.M. 37·6°C. P. 48. R. 20. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·8°C. Urine, none collected. Ten grains of Arsenic were administered during the twenty-four hours. Temp. 5 P.M. 38·1°C. P. 48. R. 20.

17*th.*—The condition of the animal is unchanged. Temp. A.M. 37·7°C. P. 44. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·8°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,032, alkaline, no albumen. Ten grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·3°C. P. 56. R. 20.

18*th.*—The general condition of the animal is unchanged. Temp. A.M. 37·5°C. P. 52. R. 16. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·8°C. Urine, turbid, viscid, greenish-brown in colour, Sp. Gr. 1,034, alkaline, no albumen. Ten grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 37·7°C. P. 44. R. 32.

19*th.*—The general condition of the animal is unchanged. Temp. A.M. 37·4°C. P. 44. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38°C. No urine was collected. Twelve grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38°C. P. 48 R. 20.

20th.—The general condition of the animal is unchanged. Temp. A.M. 37·3°C. P. 44. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·3°C. No urine was collected. Twelve grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·1°C. P. 52. R. 20.

21st.—The general condition of the animal is unchanged. Temp. A.M. 37·2°C. P. 40. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·6°C. No urine was collected. Twelve grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 37·8°C. P. 45. R. 16.

22nd.—The animal is improving in condition. The swelling and œdema on the under-surface of the belly and legs is less in amount. Temp. A.M. 37°C. P. 40. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·6°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,038, alkaline, no albumen. Ten grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 37·6°C. P. 64. R. 12.

23rd.—The general condition of the animal is satisfactory. The conjunctival vessels are somewhat injected, but there are no petechiæ visible. The pulse is strong and regular. There is a trace of swelling and œdema on the under-surface of the chest; it has otherwise been absorbed. Temp. A.M. 37·1°C. P. 52. R. 16. The hæmatozoon in absent from the blood. Temp. 1 P.M. 38·4°C. Urine, turbid, viscid, greenish-yellow in colour, Sp. Gr. 1,050, alkaline, contains no albumen. Ten grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 37·5°C. P. 52. R. 12.

24th.—The animal presents a bright appearance. The visible mucous membranes are clean and there is an entire absence of petechiæ from the conjunctivæ. The pulse continues to be strong and regular—48, and the respirations normal—12. The appetite is very good and the evacuations normal in character. Temp. A.M. 36·6°C. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·1C. No urine collected. Ten grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 37·6°C. P. 60. R. 16.

25th.—The condition of the animal is unchanged. Temp. A.M. 36·6°C. P. 44. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·1°C. Urine, turbid, viscid, greenish-orange in colour, Sp. Gr. 1,032, alkaline, contains no albumen; crystals of Calcium Carbonate, no Oxalates, no casts. Ten grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·5°C. P. 52. R. 12.

26th.—The general condition of the animal is unchanged. Temp. A.M. 37·3°C. P. 40. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38°C. Urine, turbid, viscid, greenish-brown in colour, Sp. Gr. 1,034, alkaline, no albumen. Ten grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·6°C. P. 56. R. 12.

27th.—The visible mucous membranes are somewhat injected and there are several large, dark, claret-coloured extravasations invading both conjunctivæ. The pulse is frequent but regular—44. Respirations tranquil—12. There is some slight œdema on the right of the chest. Temp. A.M. 37·3°C. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·8°C. Urine, turbid, viscid, greenish orange in colour, Sp. Gr. 1,034, alkaline, contains no albumen. Ten grains of Arsenic were given during the twenty-four hours. Temp 5 P.M. 38°C. P. 52. R. 12.

28th.—The condition of the animal is the same, with this exception that there is a small collection of gelatinous exudation in the left groin. Temp. A.M. 37·2°C. P. 40. R. 8. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38°C. No urine was collected. Ten grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·3°C. P. 60. R. 16.

29th.—The condition is unchanged. Temp. A.M. 37·3°C. P. 44. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·5°C. Urine, none collected. Ten grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 37·8°C. P. 56. R. 12.

30th.—Condition unchanged. Temp. 5 A.M. 37·3°C. P. 48. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·3°C. Urine, turbid, viscid, greenish-brown in colour, Sp. Gr. 1,038, alkaline, contains no albumen. Eight grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 37·6°C. P. 48. R. 12.

31st.—The animal presents a brighter appearance. The conjunctival petechiæ have faded, but the membranes remain injected. The pulse is 44, fairly strong and regular; the respirations have fallen to 8. If anything, there is a slight increase in the amount of œdema on the right side of the chest, but it is quite localized. The appetite is good. Temp. A.M. 37°C. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·6°C. Urine, none collected. Six grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 37·8°C. P. 64. R. 12.

1st. January 1893.—The condition of the animal is unchanged. Temp. A.M. 36·5°C. P. 44. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·4C. No urine was collected. Six grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 37·4°C. P. 56. R. 16.

2nd.—The condition of the animal is unchanged. Temp. A.M. 37°C. P. 44. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·7°C. Urine, turbid, viscid, yellowish-green in colour, Sp. Gr. 1,030, alkaline, contains no albumen. Three grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 37·8°C. P. 56. R. 12.

3rd.—The condition of the animal is unchanged. Temp. A.M. 37·1°C. P. 44. R. 12. The hæmatozoon is absent from the blood. Temp. A.M. 37·5°C. Urine, turbid, viscid, yellowish-green in colour, Sp. Gr. 1,034, alkaline, contains no albumen. Three grains of Arsenic were given to the animal in the morning. The dose was increased to grains four in the evening. Temp. 5 P.M. 37·6°C. P. 48. R. 12.

4th.—The animal is losing condition. The visible mucous membranes are tinged a yellow colour and there are extensive dark-coloured petechiæ on the conjunctival surface of the membranæ nictitantes. The pulse is normal as regards frequency—40, and the respirations are tranquil—12. There is a small patch of œdema, the size of the palm of the hand, on the right side of the under-surface of the abdomen. The appetite remains very good and the excretions normal in character. Temp. A.M. 37°C. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·8°C. Urine, turbid, viscid, green in colour, Sp. Gr. 1,028, alkaline, muddy, but there is no albumen. Eight grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 37·8°C. P. 48. R. 12.

5th.—The condition of the animal is unchanged. Temp. A.M. 37·6°C. P. 44. R. 12. The hæmatozoon is absent from the blood. Tem. 1 P.M. 37·8°C. Urine, turbid, viscid, yellowish-green, Sp. Gr. 1,036, alkaline, contains no albumen. Eight grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 37·8°C. P 48. R. 16.

6th.—The condition of the animal is unchanged. Temp. A.M. 37·2°C. P. 44. R. 8. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·7°C. No urine was collected. Ten grains of Arsenic were given during the twenty-four hours. Temp .5 P.M. 37·6°C. P. 44. R. 12.

7th.—The condition of the animal is unchanged. Temp. A.M. 37·5°C. P. 48 R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38°C. Urine, turbid, viscid, greenish-brown in colour, Sp. Gr. 1,030, alkaline, contains no albumen. Ten grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·3°C. P. 60. R. 12.

8th.—The condition of the animal is unchanged. Temp. A.M. 37·7°C. P. 52. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38°C. Urine, turbid, viscid, green in colour, Sp. Gr. 1,028, alkaline, contains no albumen. Ten grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38°C. P. 60. R. 12.

9th.—The condition of the animal is unchanged. Temp. A.M. 37·4°C. P. 48. R. 16. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·2°C. Urine, turbid, viscid, yellowish-green, Sp. Gr. 1026, alkaline, contains no albumen. Ten grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·3°C. P. 60. R. 16.

10th.—The condition of the animal is unchanged. Temp. A.M. 37·7°C. P. 52. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·4°C. Urine, turbid, viscid, yellowish-green in colour, Sp. Gr. 1,028, alkaline, contains no albumen. Ten grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·3°C. P. 64. R. 12.

11th.—This morning the animal appears much brighter, but the visible mucous membranes are still tinged a yellow colour and there are numerous bright-red petechiæ on the conjunctival membranes. The pulse is regular and fairly strong—40. Temp. A.M. 37·1°C. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·6°C. Urine, turbid, viscid, yellowish-green, Sp. Gr. 1,018, alkaline, contains no albumen. Ten grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 37·4°C. P. 56. R. 16.

12th.—The condition of the animal is unchanged. Temp. A.M. 37·2°C. P. 60. R. 16. The hæmatozoon is absent from the blood. Tem. 1 P.M. 37·8°C. No urine was collected. Ten grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M 38°C. P. 52. R. 12.

13th.—The condition of the animal is unchanged. Temp. A.M. 38°C. P. 48. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·4°C. Urine, turbid, viscid, yellowish-green in colour, Sp. Gr. 1,024, alkaline, contains no albumen. Ten grains of Arsenic were given during the twenty-four hours. Temp 5 P.M. 38·7°C. P. 60 R. 12.

14th.—The condition of the animal is unchanged. Temp. A.M. 37·7°C. P. 48 R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·4°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,036, alkaline, contains no albumen. Ten grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·4°C. P. 52. R. 12.

15*th.*—The condition of the animal is unchanged. Temp. A.M. 37·4°C. P. 48. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·3°C. Urine, turbid, viscid, greenish-yellow in colour, Sp. Gr. 1,022, alkaline, contains no albumen. Ten grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·7°C. P. 60. R. 16.

16*th.*—The condition of the animal is unchanged. Temp. A.M. 37·5°C. P. 40. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·3°C. Urine, turbid, viscid, greenish-yellow in colour, Sp. Gr. 1,026, alkaline, no albumen. Ten grains of Arsenic were given during the twenty-four hours. Temp 5 P.M. 38·2°C. P. 48. R. 12.

17*th.*—The condition of the animal is unchanged. Temp. A.M. 37·6°C. P. 48. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·4°C. Urine, turbid, viscid, greenish-yellow in colour, Sp. Gr. 1,028, alkaline contains, no albumen. Ten grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·6°C. P. 56. R. 16.

18*th.*—The condition of the animal is unchanged. Temp. A.M. 37·8°C. P. 52 R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·6°C. Urine, turbid, viscid, greenish-yellow in colour, Sp. Gr. 1,026, alkaline, contains no albumen. Ten grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 39°C. P. 68. R. 12.

19*th.*—The animal appears to have lost in condition since the 17th, and there is a swelling over the left upper eye-lid, somewhat tender on manipulation. The visible mucous membranes have regained their normal colour, but this morning the membranæ nictitantes are the seat of a fresh crop of numerous claret-coloured extravasations. There is a slight discharge of clear watery fluid from the nostrils and the animal has developed a slight cough. The pulse is regular and the respirations are tranquil. The appetite is very good and the evacuations natural in character. Temp. A.M. 39·3°C. P. 64. R. 12. The hæmatozoon is absent from the blood. Temp 1 P.M. 39·7°C. Urine, turbid, viscid, greenish-yellow in colour, Sp. Gr. 1,028, alkaline, contains no albumen. Ten grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 39·4°C. P. 64. R. 12.

20*th.*—The general condition of the animal is unchanged, but the swelling over the left eye has increased in size. Temp. A.M. 37·4°C. P. 48. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 39·2°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,018, alkaline, contains no albumen. Fourteen grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 39·8°C. P. 80. R. 12.

21*st.*—The condition of the animal is unchanged. There is slight fluctuation in the superciliary tumor. Temp. A.M. 39·7°C. P. 68. R. 8. The hæmatozoon is absent from the blood. Temp. 1 P.M. 40·1°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,023, alkaline, no albumen. Eleven grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 40°C. P. 72. R. 12.

22*nd.*—The abscess over the left eye burst in the night and this morning ʒiss of pus was evacuated. The temperature has fallen 2°C. since last night, but the general condition is unchanged. Temp. A.M. 38·1°C. P. 64. R. 20. The hæmatozoon is absent from the blood. Temp. 1 P.M. 39·3°C. Urine, turbid, viscid, greenish-brown in colour, Sp. Gr. 1,026, alkaline, contains no albumen. Eleven grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 39·4°C. P. 76 R. 12.

23*rd.*—The general condition of the animal is unchanged. Temp. A.M. 38·8°C. P. 64. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 39·3°C. Urine, turbid, viscid, brown in colour, Sp. Gr. 1,024, alkaline, contains no albumen. Eleven grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 39·4°C. P. 84. R. 12.

24*th.*—The animal presents a dull and dejected appearance. The visible mucous membranes are injected and the conjunctivæ are purple in colour, owing to the petechiæ, which have become almost confluent. The right hind limb is swollen and œdematous, but is not painful on manipulation. There is excessive lachrymation, and a discharge of glairy, somewhat viscid mucus from the nostrils. The appetite is fairly good. The pulse is small but frequent, 88 beats per minute. The breathing is tranquil—12. There is constant gurgling in the intestines with an escape of flatus, but the fæces are natural in character. Temp. A.M. 38·8°C. The hæmatozoon is absent from the blood. Temp. 1 P. M. 39.2°C. Urine, turbid, viscid, greenish-brown in colour, Sp. Gr. 1,024, alkaline, contains albumen $\frac{1}{8}$th. Eleven grains of Arsenic were given during the twenty-four hours. Temp. 5 P. M. 39·5°C. P. 80. R. 12.

25*th.*—The animal fell at 6 A.M. and death took place at 7·45 A.M.

AUTOPSY.—Five hours after death. The body is somewhat emaciated, but there is an absence of swelling and œdema from the extremities and the under-surface of the abdomen.

Thorax.—There are no adhesions of the pleuræ, but each pleural sac contains about 20 ozs. of a turbid, orange-coloured fluid.

Lungs.—The surface of the *right* is dotted over with sub-pleural petechiæ of a bright red colour, and there is a localized emphysema at the apex and along the anterior and inferior borders. *On section*, blood flows from the cut surfaces, and the tissues present healthy appearance. The *left* lung presents the same pathological changes as those found in the right, but there are in addition on the superior aspect and close to the surface-involving the posterior $\frac{1}{3}$rd of the organ two patches of consolidation separated from each other by two inches of healthy lung tissue. *On section* the one was found to measure 1·5″ × ·75″ × ·5″, the other 3″ × 2″ × 1·25″. The tissues in each case presented a dark-red colour and no interlobular exudation was present. The cavity of the *pericardium* contains two ounces of a turbid, somewhat viscid, orange-coloured fluid, but no hæmatozoa were found in it on microscopical examination.

Heart is considerably hypertrophied and weighs 7 lbs. There is a total absence of exudation round the base of the organ. The external surfaces of the ventricles are dotted over with numerous, small, dark-coloured sub-pericardial ecchymoses, and there is in addition an extensive extravasation, somewhat circular in shape and one inch in diameter. It is dark in colour and involves the wall of the right ventricle, but is surrounded by a much lighter coloured zone. *On section*, the *Right auricle* contains some dark-coloured clot, and there are a few sub-endocardial extravasations dark in colour. The *Right ventricle* is pale in colour and contains two small circular ecchymoses. The *Left auricle* presents a healthy appearance. The lining membrane of the *Left ventricle* is stained a yellowish colour, dotted over with bright red ecchymoses and several more extensive extravasations, which involve the musculi-papillares for the most part.

The *abdominal cavity* contains two ounces of a clear straw-coloured fluid.

Liver is fairly normal in size, weighs 12 lbs. 8 ozs. There are a few sub-capsular petechiæ scattered over the surfaces of both lobes and a few small calcareous nodules. *On section* the tissues present a healthy appearance.

Spleen is normal in size. There are numerous sub-capsular petechiæ of a brick-red colour. *On section* the tissues are firm and present a healthy appearance.

Kidneys.—The left weighs 2 lbs. 1 oz., the right 2 lbs. 5 ozs. The capsules strip easily, and present organs thickly dotted over with minute petechiæ. *On section* the *cortical* portions present numerous small red petechiæ. The *medullary* portions are free.

Stomach is somewhat distended. *On section* the organ is found to contain semi-digested food. The *cuticular* portion presents a perfectly healthy appearance. The *villous* portion is stained a pale greenish colour dotted over with large numbers of bright-red coloured ecchymoses lying under the mucous coat. These small extravasations are individually distinct and are for the most part circular in form, with a diameter varying from $\frac{1}{16}$th to $\frac{1}{8}$th inch. There appears to be superficial erosion of the mucous lining of the organ in places, but there is no sign of congestion at their edges.

Small Intestines.—One small extravasation is present at the commencement of the *duodenum* otherwise the *jejunum* and *ileum* are free from pathological changes.

Large Intestines present a healthy appearance.

Remarks.—This animal, an Australian Bay Mare, aged 11 years, was purchased by the Bombay Tramway Company on 22nd November 1886. It had very good health during six years which elapsed between the date of landing in India, but was attacked with Surra on the 10th December 1892.

On admission into the Laboratory Hospital the symptoms of the disease were fairly well marked, but in addition to the fact that the extremities were the seat of some swelling and œdema at such an early date, a symptom was present not previously observed in the other cases which have come under our notice, viz., the presence of two folds of skin one on each side running from between the fore-limbs to points several inches behind the shoulders. These folds were the seats of considerable deposits of jelly-like exudation.

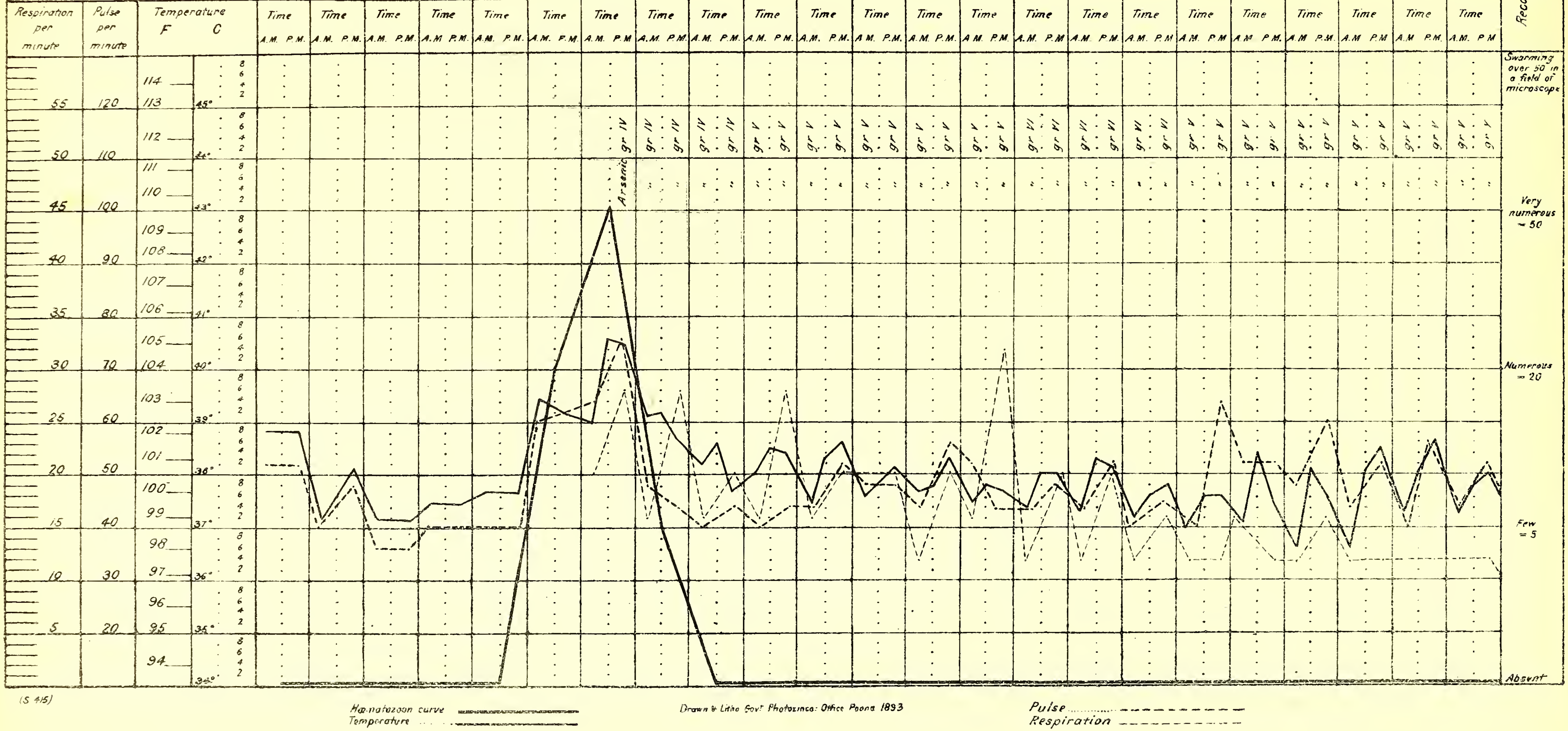
The temperature on the morning of the 5th December registered 38·8°C. and remained at the same degree on that date.

On the following morning it had fallen to 37·2°C. From this latter date until the evening of the 9th it remained within normal limits and was then 37·7°C. But on the morning of the 10th, the temperature had become elevated and was 39·4°C. On examination of the blood the hæmatozoon was discovered. At mid-day on the 11th organisms were very numerous in the blood and the temperature attained a maximum of 40·6°C. On the evening of that day an Arsenical treatment having been decided upon, the animal received the first dose, grs. iv, and by the morning of the 16th, the temperature had again fallen to 37·6°C, after which date until the evening of the 17th January 1893, a period of thirty-four days the temperature never reached 39°C. On this date an abscess formed over the left eye and from the 18th to the morning of the 22nd, the temperature oscillated between 37·4°C. and 40·1°C, but immediately fell after the evacuation of the pus on the latter date, and during the next three days the morning and evening records scarcely varied more than half a degree Centigrade, when death took place at 7·45 A.M. on the 25th January. Arsenic was administered for 45 days and the blood remained free from the hæmatozoon during 44 days, at the expiration of which period death occurred.

Australian Mare ______ Age 11 ______ Sex, Mare ______ Colour, Bay ______

Disease, "Surra" naturally acquired ______ Date of Attack, 5·12·1892. ______ Result, Death. ______ Date of Result 25·1·93. ______ Register No. LXXX ______

Dates of Observation.	Dec.r 5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
Days of Disease	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Organisms in Blood	—	—	—	—	—	N	VN	F	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Time	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.
Arsenic							gr IV	gr IV gr IV	gr IV gr IV	gr V gr V	gr V gr V	gr V gr V	gr V gr V	gr V gr V	gr VI gr VI	gr VI gr VI	gr VI gr VI	gr V gr V	gr V gr V	gr V gr V	gr V gr V	gr V gr V	gr V gr V

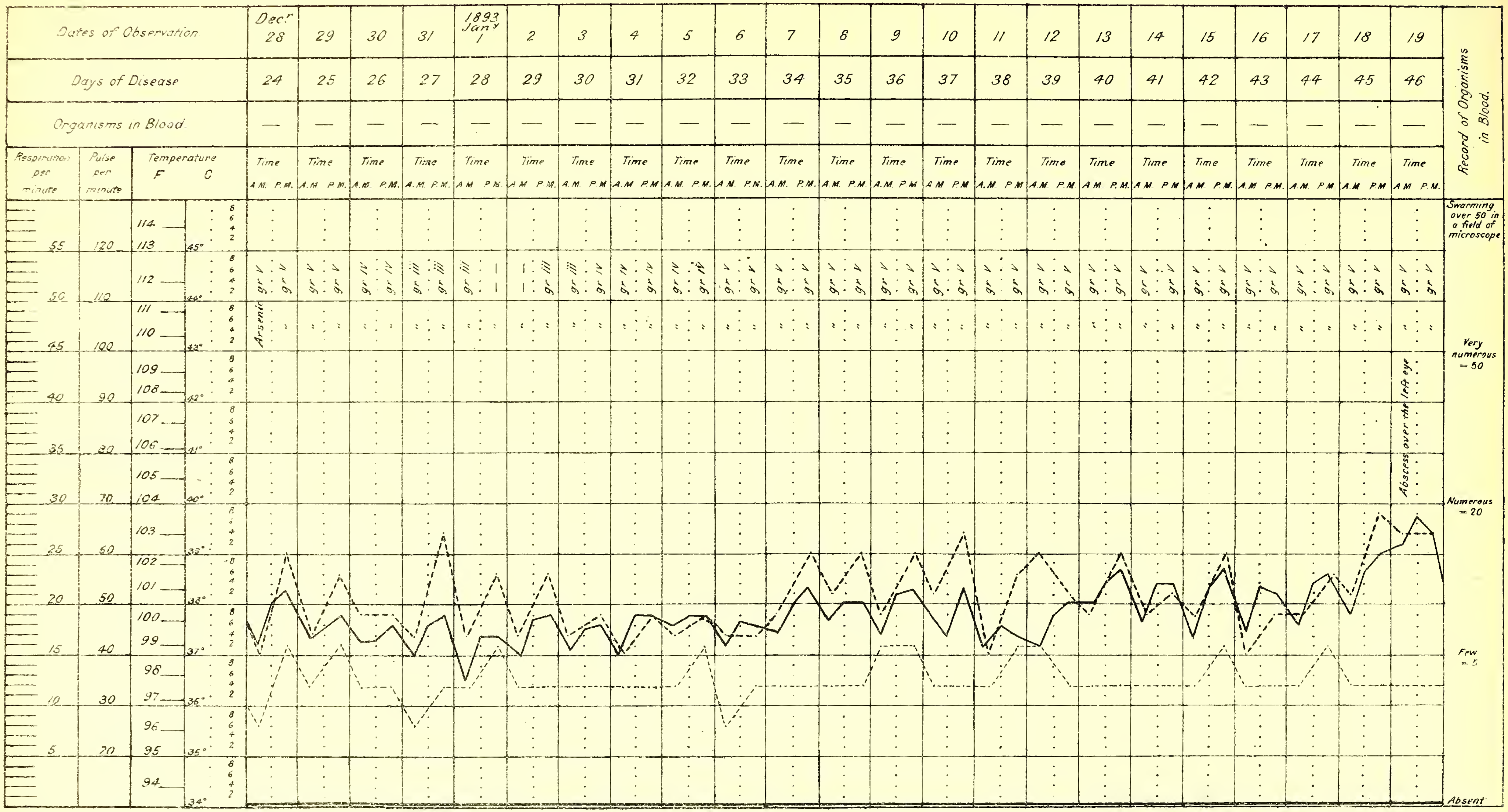


(S 415)

Drawn & Litho Govt. Photozinco: Office Poona 1893

Age ______ Sex ______ Colour ______

Disease ______ Date of ______ Result ______ Date of Result ______ Register No. LXXX



(S 415)

Hæmatozoon curve
Temperature

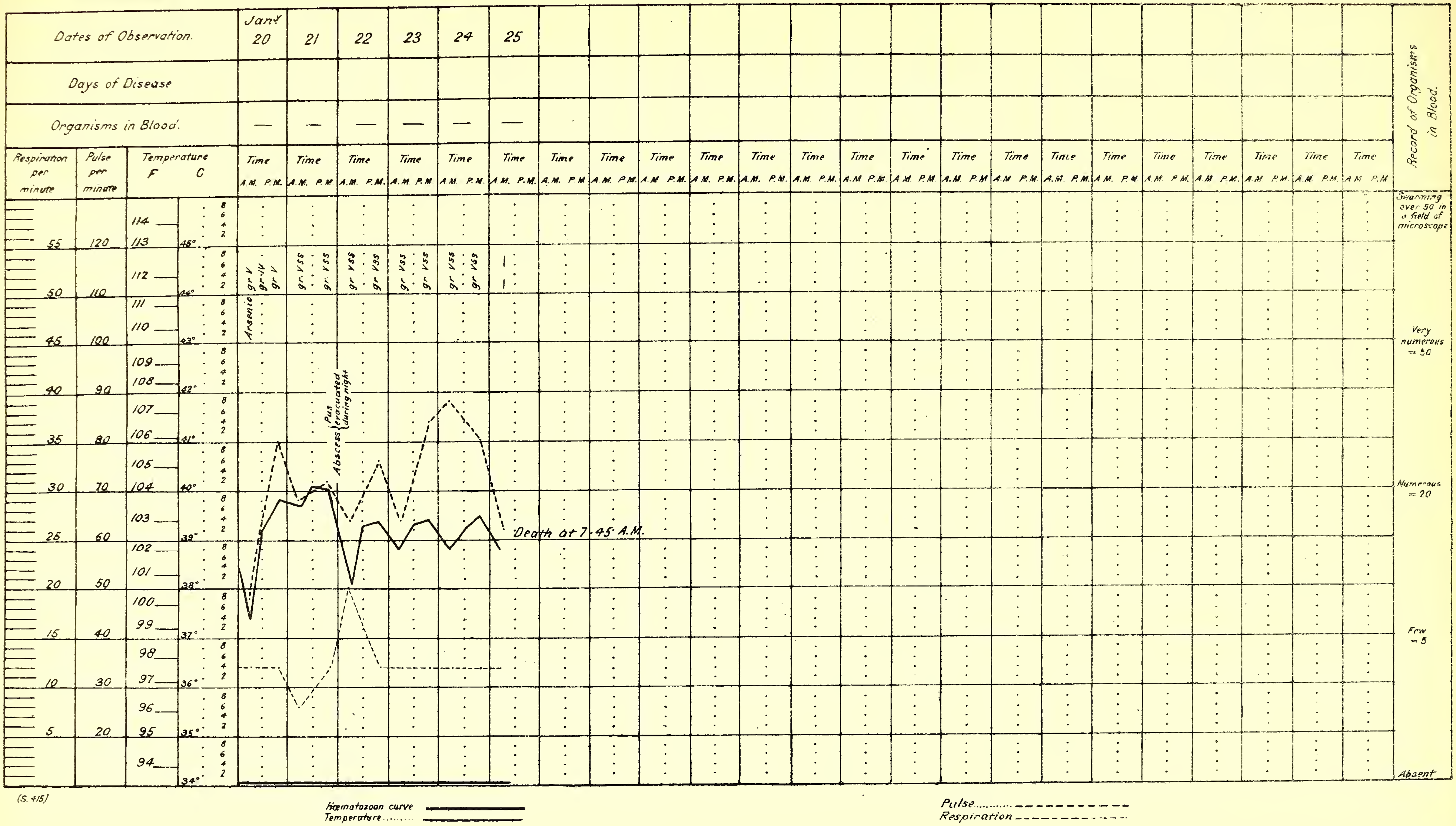
Drawn & Litho: Govt. Photozinco: Office Poona 1893

Pulse
Respiration

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION

Age ______ Sex ______ Colour ______

Disease ______ Date of ______ Result ______ Date of Result ______ Register No. LXXX.



(S. 415)

On the day of admission and the day following, the urine only contained a few Carbonate and Oxalate crystals, together with a considerable amount of Phosphates. On the 13th December, granular casts and a few red blood corpuscles were discovered, but no albumen. This condition existed until the 22nd, when very numerous granular casts from the wide and narrow tubes were present, together with crystals ot Carbonate and Oxalate of Lime, but there was a total absence of albumen and blood. On the 25th, the urine assumed a greenish-orange colour, and a trace of bile pigment was found on examination. Later from the 9th to the 11th of January, a few blood casts, leucocytes and vesical epithelium were noticed; but from the 13th to the 25th, on which latter date death occurred, only very few granular casts, a trace of bile pigment and the usual crystals were present. On the day previous to that on which the animal succumbed, albumen to the amount of 1/7 th was discovered for the first and only time during the illness.

RECORDS OF URINE.

Animal—Australian Bay Mare No LXXX. Disease. Naturally contracted "Surra."

Date.	Quantity.	Colour.	Re-action.	Sp. Gravity.	Albumen.	Phosphates.	REMARKS.
1892.							
Dec. 11	...	Turbid, viscid, orange...	Alkaline ...	1,022	Nil ...	Considerable amount	No casts, carbonate and oxalate of calcium.
12	...	Turbid, viscid, orange...	Acid ...	1,018	Nil ...	Considerable amount	,, ,, ,,
13	...	Turbid, viscid, orange...	Acid ...	1,026	Nil ...	Considerable amount	Granular casts, red blood corpuscles, oxalates no carbonates.
14	...	Turbid, viscid, orange...	Alkaline ...	1,032	Nil ...	A trace.	,, ,, ,,
15	...	Turbid, viscid, orange...	Alkaline ...	1,040	Nil ...	A trace.	,, ,, ,,
17	...	Turbid, viscid, orange...	Alkaline ...	1,032	Nil ...	A trace.	,, ,, ,,
18	...	Turbid, viscid, greenish-brown.	Alkaline ...	1,034	Nil ...	A trace.	,, ,, ,,
22	...	Turbid, viscid, yellow...	Alkaline ...	1,038	Nil ...	A trace.	Granular casts very numerous, narrow and wide tubes, crystals, carbonates and few oxalates.
23	...	Turbid, viscid, greenish-yellow.	Alkaline ...	1,050	Nil ...	A trace.	,, ,, ,,
25	...	Turbid, viscid, greenish-orange.	Alkaline ...	1,032	Nil ...	Nil ...	A trace of bile pigment and casts, &c.
26	...	Turbid, viscid, greenish-brown.	Alkaline ...	1,034	Nil ...	Nil ...	,, ,, ,,
27	...	Turbid, viscid, greenish-orange.	Alkaline ...	1,034	Nil ...	Nil ...	,, ,, ,,
30	...	Turbid, viscid. greenish-brown.	Alkaline ...	1,038	Nil ...	Nil ...	A trace of bile pigment. A few granular casts from narrow tubes.—Carbonate crystals
1893.							
Jan. 2	...	Turbid, viscid, yellowish-green.	Alkaline ...	1,030	Nil ...	Nil ...	,, ,, ,,
3	...	Turbid, viscid, yellowish-green.	Alkaline ...	1,034	Nil ...	Nil ...	,, ,, ,,
4	...	Turbid, viscid, green .	Alkaline ...	1,028	Nil ...	Nil ...	,, ,, ,,
5	...	Turbid, viscid, yellowish-green.	Alkaline ...	1,036	Nil ...	Nil ...	,, ,, ,,
7	...	Turbid, viscid, greenish-brown.	Alkaline ...	1.030	Nil ...	Nil ...	,, ,, ,,
8	...	Turbid, viscid, green ...	Alkaline ...	1,028	Nil ...	Nil ...	,, ,, ,,
9	...	Turbid, viscid, yellowish-green.	Alkaline ...	1,026	Nil ...	Nil ...	A few blood casts; leucocytes; carbonates, a few oxalate crystals and vesical epithelium.
10	...	Turbid, viscid, yellowish-green.	Alkaline ...	1,028	Nil ...	Nil ...	Few blood casts, leucocytes, calcium carbonates, few oxalates and some vesical epithelium.
11	...	Turbid, viscid, yellowish-green.	Alkaline ...	1,018	Nil ...	Nil ...	,, ,, ,,
13	...	Turbid, viscid, yellowish-green.	Alkaline ...	1,024	Nil ...	Nil ...	Very few granular casts; numerous calcium carbonate crystals; few oxalates. Trace of bile pigment.
14	...	Turbid, viscid, yellow...	Alkaline ...	1,036	Nil ...	Nil ...	,, ,, ,,
15	...	Turbid, viscid, greenish-yellow.	Alkaline ...	1,022	Nil ...	Nil ...	,, ,, ,,
16	...	Turbid viscid greenish-yellow.	Alkaline ...	1,026	Nil ...	Nil ...	,, ,, ,,
17	...	Turbid, viscid, greenish-yellow.	Alkaline ...	1,028	Nil ...	Nil ...	,, ,, ,,
18	...	Turbid, viscid, greenish-yellow.	Alkaline ...	1,026	Nil ...	Nil ...	,, ,, ,,
19	...	Turbid, viscid, greenish-yellow.	Alkaline ...	1,028	Nil ...	Nil ...	,, ,, ,, ,, ,, ,,
20	...	Turbid, viscid, yellow...	Alkaline ...	1,018	Nil ...	Nil ...	,, ,, ,,
21	...	Turbid, viscid, orange...	Alkaline ...	1,023	Nil ...	Nil ...	
22	...	Turbid, viscid, greenish-brown.	Alkaline ...	1,026	Nil ...	Nil ...	,, ,, ,,
23	...	Turbid, viscid, brown...	Alkaline ...	1,024	Nil ...	Nil ...	Numerous calcium carbonate crystals, few oxalates; bile pigment.
24	...	Turbid, viscid, greenish-brown.	Alkaline ...	1,024	$\frac{1}{7}$th	Nil ...	,, ,, ,,

CASE No. LXXXI.—GREY HERATI MARE, aged 9 years, was purchased on 6th March 1889 by the Bombay Tramway Company; (No. 197). The animal was observed ailing on the 9th December 1892 and was admitted into the Infirmary on that date with a morning temperature of 39·1°C. and Pulse 52 per minute. On the morning of the 10th, the temperature had fallen to 37·2°C. and this was maintained until the evening of the 12th, when it registered 37·7°C.; from the evening of the 13th until the evening of the 17th, it never exceeded 37·2°C. On the following morning, 18th, the temperature had risen to 39·4°C. P. 60, and on microscopical examination of the blood, the hæmatozoon was discovered. The animal was then forwarded to the Laboratory Hospital and arrived on the morning of the 21st December.

On admission.—The animal is in very good condition. There is slight fever, the visible mucous membranes are clear, but there are several extensive, claret-coloured extravasations on the conjunctivæ, especially involving the membranæ nictitantes. There is complete absence of swelling and œdema from the extremities, and the under-surface of the abdomen. The pulse is frequent – 64, but small and thready. The respirations are normal in character —16. The appetite is good and the fæces present a natural appearance. Temp. A.M. 38·7°C. There are a few hæmatozoa in the blood, well developed and active in their movements. Temp. 1 P.M. 38·8°C. Urine, none collected. Temp. 5 P.M. 38·2°C. P. 56. R. 16.

22nd December.—The condition of the animal is unchanged. Temp. A.M. 37·6°C. P. 48. R. 20. There are a few hæmatozoa in the blood. Temp. 1 P.M. 37·6°C. No urine collected. Temp. 5 P.M. 37·8°C. P. 52. R. 24.

23rd.—The general condition of the animal is unchanged. Temp. A M. 39·3°C. P. 64. R. 16. The hæmatozoa are numerous in the blood. Temp. 1 P.M. 40·1°C. No urine was collected. Arsenic in doses of four grains was given in the morning and evening in the drinking water. Temp. 5 P.M. 40·1°C. P. 64. R. 36.

24th.—The general condition of the animal is unchanged. The temperature rose yesterday to 40·1°C. and was maintained during the evening, but again fell this morning to 37·7°C. The pulse is the same—64; but the respirations again fell to 20 per minute. The hæmatozoa are few in the blood. Temp. 1 P.M. 38°C. Urine, turbid, viscid, yellow in colour. Sp. Gr. 1,034, alkaline, contains no albumen, but numerous crystals of Carbonate of Calcium. Eight grains of Arsenic were given during the day. Temp. 5 P.M. 38·4°C. P. 56. R. 16.

25th.—The animal presents a bright appearance, the visible mucous membranes are clean and the conjunctivæ are devoid of petechiæ. There is a complete absence of œdema from the limbs and under-surface of the abdomen. The appetite is very good. Temp. A.M. 37·5°C. P. 56. R. 20. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·6°C. Urine, turbid, viscid, orange in colour. Sp. Gr. 1,034, alkaline, contains no albumen, but crystals of Carbonate of Lime, no Oxalates. Nine grains of Arsenic were given in water during the twenty-four hours. Temp. 5 P.M. 39·1°C. P. 56. R. 20.

26th.—The animal presents a somewhat dull appearance; the visible mucous membranes are tinged a yellow colour, there are numerous small petechiæ invading the conjunctiva of the left eye, but they are absent from the right. The pulse is frequent—52, weak and thready. The respirations, 16, are tranquil. Temp. A.M. 38°C. There are a few hæmatozoa in the blood. Temp. 1 P.M. 38·6°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,026, alkaline, contains no albumen. Nine grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·7°C. P. 56. R. 20. Exercised in the morning and evening.

27th.—The general condition of the animal is unchanged. The pulse is frequent—56, the beat somewhat forcible with an abrupt wave, totally different to the observation recorded yesterday. Respirations 12. The limbs are fine and there is an absence of swelling from the extremities and under-surface of the abdomen. Temp. A.M. 38·4°C. P. 56. R. 12. There are a few hæmatozoa in the blood. Temp. 1 P.M. 38·8°C. Urine, turbid, viscid, yellow in colour. Sp. Gr. 1,026, alkaline, contains no albumen. Ten grains of Arsenic were given during the twenty-four hours. The animal was exercised in the morning and evening for fifteen minutes. Temp. 5 P.M. 39·3°C. P. 64. R. 20.

28th.—The general condition of the animal is unchanged. Temp. A.M. 39·4°C. P. 68. R. 16. There are a few hæmatozoa in the blood. Temp. 1 P.M. 39·4°C. Urine, turbid, viscid, yellow in colour. Sp. Gr. 1,025, alkaline, contains no albumen. Ten grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 40·4°C. P. 64. R. 20. This evening at 6 P.M. the animal suddenly passed some ounces of urine dark-red in colour, which contains a considerable amount of the colouring matter of the blood, for on microscopical examination only a few red blood corpuscles and blood casts, together with a few Carbonate crystals were discovered, but no Oxalates.

29th.—The animal presents a bright appearance, and has not as yet lost in its general condition. The visible mucous membranes retain their yellow tinge and there are a few petechiæ on the conjunctivæ. The pulse is somewhat frequent—60, but regular; respirations 24. The appetite is very good and the evacuations healthy in character. Temp. A. M. 39·°C. The hæmatozoon is absent from the blood. Temp. 1 P.M. 39·6°C. Urine, turbid, viscid, brown. Sp. Gr. 1,028, alkaline, contains albumen $\frac{1}{9}$th; also a few blood casts and enormous numbers of granular casts varying in size from the widest to the narrowest tubes. There are also a few large octahedral crystals of Oxalate of Lime, but no Carbonates. Ten grains of Arsenic were administered during the twenty-four hours. Temp. 5 P.M. 39·2°C. P. 56. R. 32.

30*th*.—To a casual observer, the animal would present no symptoms of disease ; but on closer examination the visible mucous membranes present an orange colour and there are a few petechiæ dotted over the conjunctivæ. The extremities are fine and there is no swelling or œdema on the under-surface of the abdomen, or between the fore-limbs. Temp. A.M. 38°C. P. 52. R. 16. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·7°C. Urine, turbid, viscid, like porter, alkaline. Sp. Gr. 1,036 ; albumen $\frac{1}{8}$th. Eight grains of Arsenic were administered during the twenty-four hours. Temp. 5 P.M. 39·°C. P. 60. R. 16.

31*st*.—The condition of the animal is unaltered, with the exception of a slight patch of œdema lying over the Right Spur Vein. Temp. A.M. 38·°C. P. 48. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·5°C. Urine, turbid, viscid, like porter, Sp. Gr. 1,040, alkaline, contains albumen $\frac{1}{7}$th. Six grains of Arsenic were given during the twenty-four hours. Temp. 5 P. M. 38·7°C. P. 56. R. 20.

1*st January* 1893.—The condition of the animal is unchanged. Temp. A.M. 36·8°C. P. 48. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·4°C. In the evening the animal passed urine resembling porter in colour. Sp. Gr. 1,046, alkaline, contains albumen $\frac{1}{5}$th ; a few red blood corpuscles and numerous granular casts. Three grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 39·4°C. P. 56. R. 16.

2*nd*.—The animal presents a somewhat dull appearance this morning ; it is now losing flesh, but there is no sign of œdema about the limbs or under-surface of the abdomen. The pulse is frequent but regular, and the respirations tranquil. The appetite is very good and the evacuations healthy in character. Temp. A.M. 37·4°C. P. 52. R. 16. There are a few hæmatozoa in the blood. Temp. 1 P.M. 38·4°C. Urine, turbid, viscid, yellowish-brown in colour. Sp. Gr. 1,044, alkaline, contains albumen $\frac{1}{8}$th. Three grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·4°C. P. 60. R. 16.

3*rd*.—This morning the animal presents a bright and lively appearance ; the visible mucous membranes are yellow in colour, and the conjunctivæ petecchiated. There is however no swelling or œdema of the extremities or under-surface of the abdomen. The pulse is frequent, the vessel cord-like under the finger, and it presents a somewhat high tension —64. The respirations continue tranquil—16. The temperature rose steadily during yesterday and registered 39·6°C. at 7 A.M. The appetite is very good and the evacuations are healthy in character. There are a few hæmatozoa in the blood. Temp. 1 P.M. 40·3°C. Urine, turbid, viscid, brown in colour. Sp. Gr. 1,030, alkaline, contains no albumen. The dose of Arsenic, which was gr. iii in the morning, has been increased to gr. iv this evening. Temp. 5 P.M. 40·7°C. P. 72. R. 20.

4*th*.—The animal presents rather a dull appearance and the petechiæ on the conjunctivæ are large and of a dark-red colour. There is a complete absence of œdema from the extremities and under-surface of the abdomen. The appetite remains very good. Temp. A.M. 37·4°C. P. 60. R. 16. The hæmatozoa are few in the blood. Temp. 1 P.M. 38·4°C. Urine, turbid, viscid, dark blood in colour. Sp. Gr. 1,030, alkaline, contains no albumen. Nine grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·4°C. P. 64. R. 24.

5*th*.—The condition of the animal is unchanged. Temp. A.M. 38·6°C. P. 52. R. 16. The hæmatozoa are numerous in the blood. Temp. 1 P.M. 39·3°C. Urine, turbid, viscid, brown-yellow in colour. Sp. Gr. 1,042, alkaline, contains no albumen. Nine grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 39·7°C. P 56. R. 20.

6*th*.—The condition of the animal is unchanged. Temp. A.M. 39·3°C. P. 64. R. 20. The hæmatozoa are few in the blood. Temp. 1 P.M. 39°C. Urine, turbid, viscid, brown-yellow in colour. Sp. Gr. 1,046, alkaline, contains no albumen, few crystals. Nine grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·4°C. P. 64. R. 20.

7*th*.—The animal appears brighter than it has done for several days. The visible mucous membranes remain of a yellow colour, but there is an absence of petechiæ from the conjunctivæ. The pulse is frequent—52, but regular, and the respirations tranquil—16 per minute. There is an absence of œdema from the extremities and belly. Appetite good. Temp. A.M. 37·8°C. The hæmatozoa are few in the blood. Temp. 1 P.M. 38·1°C. Urine, turbid, viscid, orange in colour. Sp. Gr. 1,046, alkaline, contains no albumen. Ten grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·4°C. P. 52. R. 16.

8*th*.—The condition of the animal is unchanged. Temp. A.M. 38·1°C. P. 52. R. 16. Only two hæmatozoa were observed in two coverglass specimens of the blood, and these were unusually torpid and sluggish in their movements. Temp. 1 P.M. 39°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,040, alkaline, contains no albumen. Five grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 40·1°C. P. 60. R. 16.

9th.—The condition of the animal is unchanged. Temp. A.M. 40·2°C. P. 68. R. 16. Five hæmatozoa were seen in two coverglass specimens of the blood. Temp. 1 P.M. 40·3°C. Urine turbid, viscid, sherry-coloured. Sp. Gr. 1,038, alkaline, contains no albumen. No Arsenic was given to the animal. Temp. 5 P.M. 39·7°C. P. 72. R. 20.

10th.—The animal presents a dull and depressed appearance. It stands for a considerable time in one position, but not with the head hanging; it then brightens up and immediately takes green grass when offered. The visible mucous membranes are still tinged a yellow colour, but there is an absence of conjunctival petechiæ. The limbs remain fine and there is no œdema of the under-surface of the abdomen. The pulse is strong and regular and the breathing tranquil. The appetite has somewhat fallen off since yesterday. The fæces present a natural appearance. Temp. A.M. 38·4°C. P 56. R. 24. Only one hæmatozoon was observed in two coverglass specimens of the blood. Temp. 1 P.M. 38·4°C. Urine, turbid, viscid, orange in colour. Sp. Gr. 1,042, alkaline, contains no albumen. No Arsenic was given to the animal. Temp. 5 P.M. 38·6°C. P. 56. R. 12.

11th.—The animal presents a brighter appearance this morning. The appetite has considerably improved; otherwise the condition is unchanged. Temp. A.M. 37·6°C. P. 48. R. 12. Only one hæmatozoon was observed in two coverglass specimens of the blood. Temp. 1 P.M. 38·°C. Urine, turbid, viscid, orange in colour. Sp. Gr. 1,052, alkaline, contains no albumen. Five grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 39·5°C. P. 52. R. 16.

12th.—The condition of the animal is unchanged. Temp. A.M. 38·8°C. P. 60. R. 16. There are few hæmatozoa in the blood. Temp. 1 P.M. 39·4°C. Urine, turbid, viscid, orange in colour. Sp. Gr. 1,044, alkaline, contains no albumen. Ten grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 39·6°C. P. 52. R. 16.

13th.—The condition of the animal is unchanged. Temp. A.M. 39·4°C. P. 52. R. 16. There are few hæmatozoa in the blood. Temp. 1 P.M. 39·6°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,042, alkaline, contains no albumen. Eleven grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 40·5°C. P. 64. R. 16.

14th.—The condition of the animal is unchanged. Temp. A.M. 40·4°C. P. 64. R. 16. The hæmatozoon is absent from the blood. Temp. 1 P.M. 40·8°C. Urine, turbid, viscid, orange in colour. Sp. Gr. 1,038, alkaline, contains no albumen. Eleven grains of Arsenic were given during the twenty-four hours. Temp. 5 A.M 40·6°C. P. 60. R. 12.

15th.—The condition of the animal is unchanged. Temp. A.M. 38·8°C. P. 56. R. 16. The hæmatozoon is absent from the blood. Temp. 1 P.M. 39·2°C. Urine, turbid, viscid, orange-yellow in colour, Sp. Gr. 1,042, alkaline, contains no albumen. Twelve grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 39·8°C. P. 64. R. 16.

16th.—The condition of the animal is unchanged. Temp. A.M. 38·1°C. P. 52. R. 16. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·7°C. Urine, turbid, viscid, orange in colour. Sp. Gr. 1,052, alkaline, contains no albumen. Thirteen grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 39·2°C. P. 52. R. 12.

17th.—The condition of the animal is unchanged. Temp. A.M. 38·3°C. P. 52. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·8°C. Urine, turbid, viscid, orange in colour. Sp. Gr. 1,044, alkaline, contains no albumen. Fourteen grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 39·1°C, P. 56. R. 12.

18th.—The condition of the animal is unchanged. Temp. A.M. 38·5°C. P. 52. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·7°C. Urine, turbid, viscid, orange in colour. Sp. Gr. 1,050 alkaline, contains no albumen. Fourteen grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 39·2°C. P. 56. R. 16.

19th.—The animal presents a fairly bright appearance and has lost very slightly in condition during the last two weeks. The mucous membranes are clearer than they were, but there are a few small petechiæ dotted over both conjunctivæ. The limbs are fine and there has been up to the present date, with the exception of a small patch 2″ × 2″ over the spur vein, probably due to the sting of an insect, no sign of œdema on the under-surface of the abdomen. The pulse is fairly strong, but there is a slight intermittence every fifth beat. The breathing is tranquil. The appetite continues very good and the evacuations natural in character. Temp. A.M. 39·2°C. P. 56 R. 12. One hæmatozoon was discovered in two coverglass specimens of blood. Temp. 1 P.M. 39·4°C. Urine, turbid, viscid, orange-yellow in colour, Sp. Gr. 1,044, alkaline, contains no albumen, but numerous granular casts and Carbonate of Lime crystals. Fifteen grains of Arsenic were given during tho twenty-four hours. Temp. 5 P.M. 39·8°C. P. 60. R. 12.

20th.—The animal appears to have lost flesh about the Gluteal Region since the last note was taken yesterday. The visible mucous membranes are yellow, and there are numerous bright-red petechiæ invading the membranæ nictitantes. The pulse is somewhat full and frequent, and the tension high; the breathing remains normal in character and frequency. Temp. A.M. 39·6°C. P. 60. R. 16. The hæmatozoa are numerous in the blood. Temp. 1 P.M. 39·5°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,044, alkaline, contains no albumen. Fifteen grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 40°C. P. 56. R. 12.

21st.—The condition of the animal is unchanged. Temp. A.M. 39·6°C. P. 56. R. 16. The hæmatozoa are very numerous in the blood. Temp. 1 P.M. 39·7°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,044, alkaline contains no albumen. The animal drank no water at all during the 24 hours; consequently no Arsenic was taken by the animal during the day. Temp. 5 P.M. 40·2°C. P. 64. R. 16.

22nd.—The animal presents a bright appearance, but the loss in condition is progressive although slow. The visible mucous membranes are of a dirty-yellow colour, but there is an absence of petechiæ. Temp. A.M. 39·2°C. P. 56. R. 16. The hæmatozoa are few in the blood. Temp. 1 P.M. 39·1°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,050, alkaline. contains no albumen. No Arsenic was taken by the animal during the twenty-four hours. Temp. 5 P.M. 40·1°C. P. 56. R. 12.

23rd.—The general condition of the animal is unchanged. Temp. A.M. 40·1°C. P. 60. R. 12. The hæmatozoa are very numerous in the blood. Temp. 1 P.M. 40·3°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,052, alkaline contains no albumen. As the hæmatozoa are very numerous in the blood, the temperature continues to be elevated, and no water containing Arsenic has been taken during the day. Quinæ Sulph. ʒ iv was ordered at 7 P.M. in a pint of water. Temp. 5 P.M. 40·4°C. P. 68. R. 16.

24th.—The animal presents a dull appearance, the visible mucous membranes are orange in colour, with extensive red-coloured petechiæ invading both conjunctivæ, and there is excessive lachrymation. The limbs remain fine and there is a complete absence of œdema from the under-surface of the abdomen. The pulse is frequent, 56, but regular and of low tension. The breathing tranquil and normal. The anal sphincter is paralysed and the anus patent. There is a constant escape of flatus followed by a certain quantity of watery fluid from the rectum. The appetite is fairly good, and the animal has eaten its corn and hay as usual. Temp. A.M. 38·5°C. R. 16. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,044, alkaline, contains no albumen. Ten grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 37·4°C. P. 56. R. 16.

25th.—The animal has fallen off very much in condition during the last few days, and looks somewhat tucked up this morning, but continues to feed, and lies down during the night. Its gait is however weak and uncertain, the fore-limbs after flexion are extended with a jerky movement. The pulse continues frequent but regular, 48; the respirations are tranquil, 12. The bowels are somewhat constipated and some of the dung balls are coated with mucus. Temp. A.M. 36·8°C. The hæmatozoa are few in the blood. Temp. 1 P.M. 38·5°C. Urine, turbid, viscid, brown in colour, Sp. Gr. 1,048, alkaline contains no albumen. Five grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 37·1°C. P. 56. R. 16.

26th.—The animal is weaker this morning, the head is hanging down, and the eyes are half-closed. The gait is staggering, but the animal continues to lie down and get up without assistance. After remaining stationary for a short time, the animal proceeds to walk round in a circle, making its right fore-limb more or less the pivot; at the expiration of a variable period from twenty minutes to half an hour, the animal falls to the ground and remains in that position for some time. It then gets up again without assistance, and eats a little grass, &c. This mode of progression continued all day and during the evening. Temp. 8 A.M. 38·5°C. P. 56 R. 12. The hæmatozoa are few in the blood. Temp. 1 P.M. 38·8°C. No urine collected. Five grains of Arsenic were given to the animal in the morning. Temp. 5 P.M. 39·3°C. P. 56. R. 12.

27th.—The animal continued to walk round in a circle for the greater part of the night, and this morning reels to and fro like a drunken man. It is unable to eat any corn, and has not taken any water. Temp. A.M. 38·8°C. P. 60. R. 12. The hæmatozoa are numerous in the blood. Temp. 1 P.M 39·6°C. No urine was collected. No Arsenic was administered. Temp. 5 P.M. 39·4°C. P. 60. R. 20. The animal continued the circus movements until it fell at 6 P.M. It was then decided to place it in slings in order to keep it at rest. This was consequently done at 6-30 P.M.

28th.—This morning the condition of the animal is unchanged. Temp. A.M. 36·8°C. P. 44. R. 12. The hæmatozoon is absent from the blood, but the latter presents an extraordinary appearance. The red blood corpuscles have all run together, so that their individuality is lost. The white corpuscles are increased in number and size. There are also a few amœboid corpuscles, and numerous large colourless corpuscles, the diameter of which is equal to that of four leucocytes. The latter contain in their interior varying numbers of altered red corpuscles from 1 to 7. Urine, turbid, viscid, orange in colour. Sp. Gr. 1,034, alkaline, contains no albumen.

At 9·30 A.M. Chloroform was administered and death took place at 9·38.

AUTOPSY.—The body is somewhat emaciated. There is a complete absence of swelling and œdema from the under-surface of the abdomen and extremities.

On Section.—All the tissues of the body are stained an orange colour.

On opening the Thorax.—The *right* pleural cavity contains two ounces of a turbid, orange-coloured fluid, from which the hæmatozoon is found to be absent on microscopical examination. The *left* pleural cavity is free from fluid. There are no pleural adhesions.

Lungs.—Both organs present a yellowish pink colour, but are free from sub-pleural ecchymoses or any form of extravasation. The *right* lung *on section* presents a healthy appearance. The anterior six inches of the apex of the *left* lung present a peculiar appearance. The pleura covering it is the seat of œdema and beneath it is found to be lying a thin layer $\frac{1}{8}$th inch in thickness of a yellow, transparent, jelly-like exudation. *On section,* the tissues present a pinkish red colour, and are the seat of consolidation, the lobules being individually separated and surrounded by a thin layer of the exudation varying from $\frac{1}{12}$th to $\frac{1}{8}$th of an inch in thickness. The remaining portion of this organ presents a healthy appearance, with this exception that the tissues, as before mentioned, are stained an orange colour throughout.

There is no fluid in the *pericardial* cavity.

Heart weighs 4 lbs. 5 ozs.

External surface.—The base is the seat of fat. The surface of the muscular portion of the organ is free from extravasations of blood.

On Section.—The *right auricle* contains some fluid blood; endocardial lining stained an orange colour, but is free from sub-endocardial extravasations. The *right ventricle* ditto.

The *left auricle* and *ventricle* present a similar appearance.

The *valves* present a healthy appearance.

Abdominal Cavity—Is free from fluid.

Liver weighs 11 lbs. 7 ozs. There are signs of old peri-hepatitis of the right lobe; the left is free. There are numerous small yellow concretions visible beneath the capsule, and *on section* the tissues are dark red in colour, friable, and the concretions are found to invade the tissues generally.

Spleen.—Is more than twice the ordinary size and weighs 4 lbs. 6 ozs. There are a few sub-capsular petechiæ of a red-brick colour on the surfaces of the organ, but more especially on its rounded borders. *On Section,* the tissues are firm and present a normal appearance.

Kidneys.—The right weighs 1 lb. 7 ozs; the left 1 lb. 3 ozs. The capsules strip easily, but with the exception of a few injected veins at the most dependent parts of the organs. the external cortical portion does not present any pathological change. *On Section,* the Malpighian corpuscles are visible as red points and the rest of the tissues are more or less stained of an orange colour.

Stomach—Is somewhat small and contracted. *On section,* there is a small quantity of semi-digested food in its cavity. The *cuticular* portion presents a healthy appearance. The *villous* portion along the line of demarcation is somewhat congested, but there is no sign of ulceration or erosion of the mucous membrane. There are no '*spiroptera*' tumors.

Intestines.—Small and large are deeply stained an orange colour, but present no pathological changes.

Bladder.—Healthy.

Brain.—The superficial veins are injected, but there are no petechiæ on the surface of the hemispheres.

On Section.—The substance of the brain presents a healthy appearance, but the lateral ventricles are somewhat distended with an opalescent fluid, in which on microscopical examination the hæmatozoon could not be discovered.

No *parasites* of any kind were observed along the gastro-intestinal tract.

Remarks.—This animal, a Grey Herati Mare, aged 9 years, was purchased on 6th March 1889, and until December 9th, 1892, on which date it was seen to be ailing, had, during the three years and nine months it was working in the Bombay Tramway Company, good health.

On admission.—The animal was in very good condition, and it was difficult to imagine simply from looking at it that it was the subject of Surra. On examination, however, it was found to have fever, extensive claret-coloured extravasations on the conjunctivæ, and a frequent, small and thready pulse, and on microscopical examination, the hæmatozoon was found in small numbers in the blood. After keeping the animal under observation for two days, the temperature in the meantime falling from 39°C. to 37·6°C., it was subjected to a treatment consisting of two doses of Arsenic daily in increasing doses in the form of Liq. Arsenicalis, P.B., the first dose having been given on the morning of the 23rd December. (Arsenic grs. iv). Temp. 40·1°C. The hæmatozoa were numerous in the blood. On the morning of the 24th, the temperature fell to 37·7°C. and the hæmatozoa were few, and by the following day the former registered 37·5°C. and the latter was absent from the blood. From this date until the evening of the 28th, the temperature steadily rose until it attained a maximum of 40·4°C. at 5 P.M., the organisms being present in small numbers in the blood. One hour later the animal suddenly passed some ten ounces of urine, of a dark-red colour, which on microscopical examination was found to contain a few red corpuscles and blood casts. By the morning of the 29th, the temperature had fallen 1·4°C. and continued to do so until 8 A.M. on January 1st, 1893, when it registered 36·8°C. During this period the hæmatozoon was absent from the blood. On the evening of the same day the temperature again rose to 39·4°C. but again fell two degrees by the morning of the 2nd at which time the organism had again appeared in the circulation, and continued present until the 7th. By the evening of the 3rd the temperature had attained a maximum of 40·7°C., P. 72, R. 20, but during the night a sudden fall took place of 3·3°C. (5·9°F.) P. 60, R. 16, but no alteration was observed in the number of hæmatozoa present in the blood.

From the 4th until the morning of the 16th, three exacerbations followed by recrudescences in temperature took place, each period lasting several days, the maxima occurring on the 5th, 9th, and 14th, when the following thermometric observations—39·7°, 40·3° and 40·8°C.—were respectively registered; the lowest minimum temperature, 37·6°C., being recorded on the morning of the 11th.

The Arsenical treatment was omitted from the evening of the 8th January to that of the 11th in consequence of the animal taking little or no water to drink, but from the 21st to the 23rd of January the animal absolutely refused water.

On the morning of the 16th, the temperature was 38·1°C. and the hæmatozoon absent from the blood, but from this date until the evening of the 23rd the former gradually became elevated until it registered 40·4°C, the organisms varying during this period between absent and very numerous. Again a recrudescence in the temperature 3·6°C. (6·5°F.) occurred, but this time the fall was gradual and occupied a period of thirty-six hours. An abrupt fall, however, occurred in the number of hæmatozoa, for in a single night—the 23rd, when very numerous, they were found to be absent on the morning of the 24th. The last paroxysm occupied 72 hours and terminated in death. The temperature, which registered on the morning of the 25th, 36·8°C., rose to 38·5°C. at noon, but fell to 37·1°C. at 5 P.M. On the following evening, after rising gradually all day, it was 39·3°C. and by mid-day on the 27th it attained its maximum height 39·6°C. and finally registered 36·8°C. at death on the 28th at 9·30 A.M. The animal lived 42 days from the discovery of the organism in the blood. Six paroxysms occurred lasting in all 29 days, during which the hæmatozoon was present, and five intermissions occupying 13 days—the animal dying at the commencement of the sixth intermission during which the organism was absent from the blood.

RECORD OF URINE.

Animal, Grey Herati Mare, No. LXXXI. Date 18th December 1892. Disease "Surra", naturally contracted.

Date.		Quantity.	Colour.	Re-action.	Sp. Gravity.	Albumen.	Phosphates.	REMARKS.
1892.								
December	24 ...	...	Turbid, viscid, yellow ...	Alkaline ..	1,034	Nil ...	...	Calcium carbonate; no oxalates.
,,	25 ...	...	Turbid, viscid, orange yellow.	Alkaline ...	1,034	Nil ..	...	Calcium carbonate crystals; no oxalates; no casts.
,,	26 ...	...	Turbid, viscid, yellow...	Alkaline ...	1,026	Nil ...	...	Do. do.
,,	27 ...	...	Turbid, viscid, yellow...	Alkaline ..	1,026	Nil ...	...	Do. do.
,,	28 ...	...	Turbid, viscid, yellow...	Alkaline ...	1,025	A trace	...	A few blood casts; carbonate crystals.
,,	29 ...	...	Turbid, viscid, smoky-red.	Alkaline ...	1,028	$\frac{1}{9}$th ...	...	Do. do.
,,	30 ...	...	Turbid, viscid, porter...	Alkaline ...	1,036	$\frac{1}{8}$th ...	...	Enormous numbers of granular casts; also a few blood casts from narrow, medium and broad tubes; a few large oxalate, but no carbonate crystals.
,,	31 ...	...	Turbid, viscid, porter...	Alkaline ...	1,040	$\frac{1}{7}$th ...	...	Do. do.
1893.								
January,	1 ...	...	Turbid, viscid, like porter.	Alkaline ...	1,046	$\frac{1}{5}$th ...	...	Do. do.
,,	2 ...	...	Turbid, viscid, orange...	Alkaline ...	1,044	$\frac{1}{5}$th ...	...	Few do. do. + CaCo$_3$
,,	3 ...	...	Turbid, viscid, brown...	Alkaline ...	1,030	Nil ...	...	Few do. do. do.
,,	4 ...	...	Turbid, viscid, dark ...	Alkaline ...	1,030	Nil ...	...	Few do. do. do.

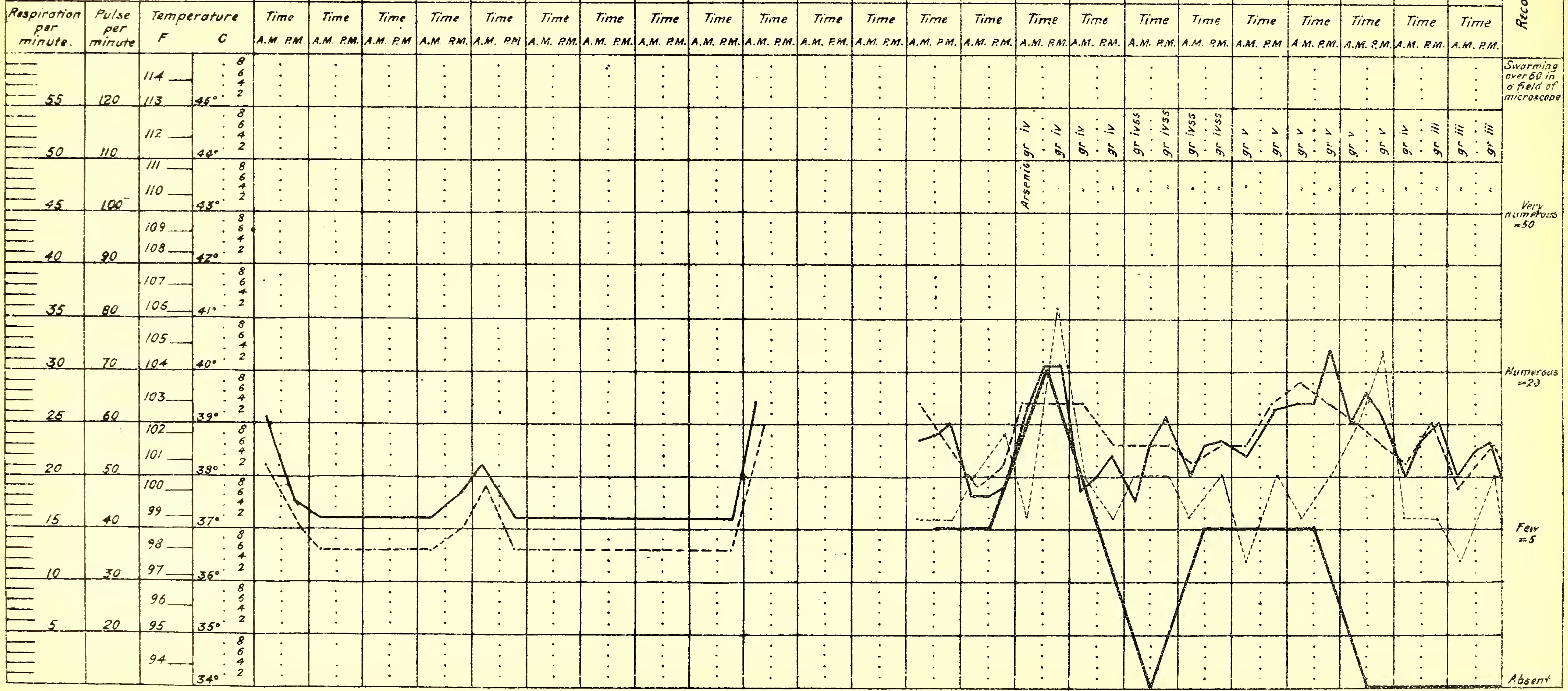
Date.		Quantity.	Colour.	Re-action.	Sp. Gravity.	Albumen.	Phosphates.	Remarks.
1893.								
January	5 ...	...	Turbid, viscid, reddish-yellow.	Alkaline ...	1,042	Nil ...	...	Numbers of granular casts; also a few blood casts from narrow, medium and broad tubes; a few large oxalate, but no carbonate crystals.
,,	6 ...	...	Turbid, viscid, reddish-yellow.	Alkaline ...	1,046	Nil ...	...	Few crystals; no casts.
,,	7 ...	...	Turbid, viscid, orange...	Alkaline ...	1,046	Nil ...	...	Do. do.
,,	8 ...	...	Turbid, viscid, orange...	Alkaline ...	1,040	Nil ...	...	Do. do.
,,	9 ...	...	Turbid, viscid, sherry...	Alkaline ...	1,038	Nil ...	...	No casts, numerous small oxalate crystals; few carbonates: no red blood corpuscles.
,,	10 ...	...	Turbid, viscid, orange...	Alkaline ...	1,042	Nil ...	...	Do. do.
,,	11 ...	...	Turbid, viscid, orange...	Alkaline ...	1,052	Nil ...	...	Do. do.
,,	12 ...	...	Turbid, viscid, orange...	Alkaline ...	1,044	Nil ...	...	Do. do.
,,	13 ...	...	Turbid, viscid, orange...	Alkaline ...	1,042	Nil ...	...	Do. do.
,,	14 ...	...	Turbid, viscid, orange...	Alkaline ...	1,038	Nil ...	...	Numerous granular and a few blood casts; a few carbonate, but numerous oxalate of lime crystals.
,,	15 ...	...	Turbid, viscid, orange...	Alkaline ...	1,042	Nil ...	...	Do. do.
,,	16 ...	...	Turbid, viscid, orange...	Alkaline ...	1,052	Nil ...	...	Do. do.
,,	17 ...	...	Turbid, viscid, orange...	Alkaline ...	1,044	Nil ...	...	Do. do.
,,	18 ...	...	Turbid, viscid, orange...	Alkaline ...	1,050	Nil ...	...	Numerous crystals of carbonate and oxalate of lime. No casts.
,,	19 ...	...	Turbid, viscid, orange...	Alkaline ...	1,044	Nil ...	...	Do, do.
,,	20 ...	...	Turbid, viscid, orange...	Alkaline ...	1,044	Nil ...	...	Do. do.
,	21 ...	...	Turbid, viscid, orange...	Alkaline ...	1,044	Nil ...	...	Do. do.
,,	22 ...	...	Turbid, viscid, orange...	Alkaline ...	1,050	Nil ...	...	Do. do.
,,	23 ...	...	Turbid, viscid, orange...	Alkaline ...	1,052	Nil ...	...	Do. do.
,,	24 ..	...	Turbid, viscid, orange...	Alkaline ...	1,044	Nil ...	...	Do. do.
,,	25 ...	...	Turbid, viscid, brown ...	Alkaline ...	1,048	Nil ...	...	Do. do.
,,	28 ...	...	Turbid, viscid, orange...	Alkaline ...	1,034	Nil ...	...	Do. do.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Grey Herati Mare ______ Age, 9 ______ Sex, Mare ______ Colour, Grey ______

Disease, Naturally contracted "Surra" ______ Date of attack 18.12.92 ______ Result, Death ______ Date of Result, 28.1.93 ______ Register No. LXXXI. ______

Dates of Observation.	Dec.r 9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Days of Disease										1	2	3	4	5	6	7	8	9	10	11	12	13	14
Organisms in Blood.										F			F	F	N	F	—	F	F	F	—	—	—



(S. 415)

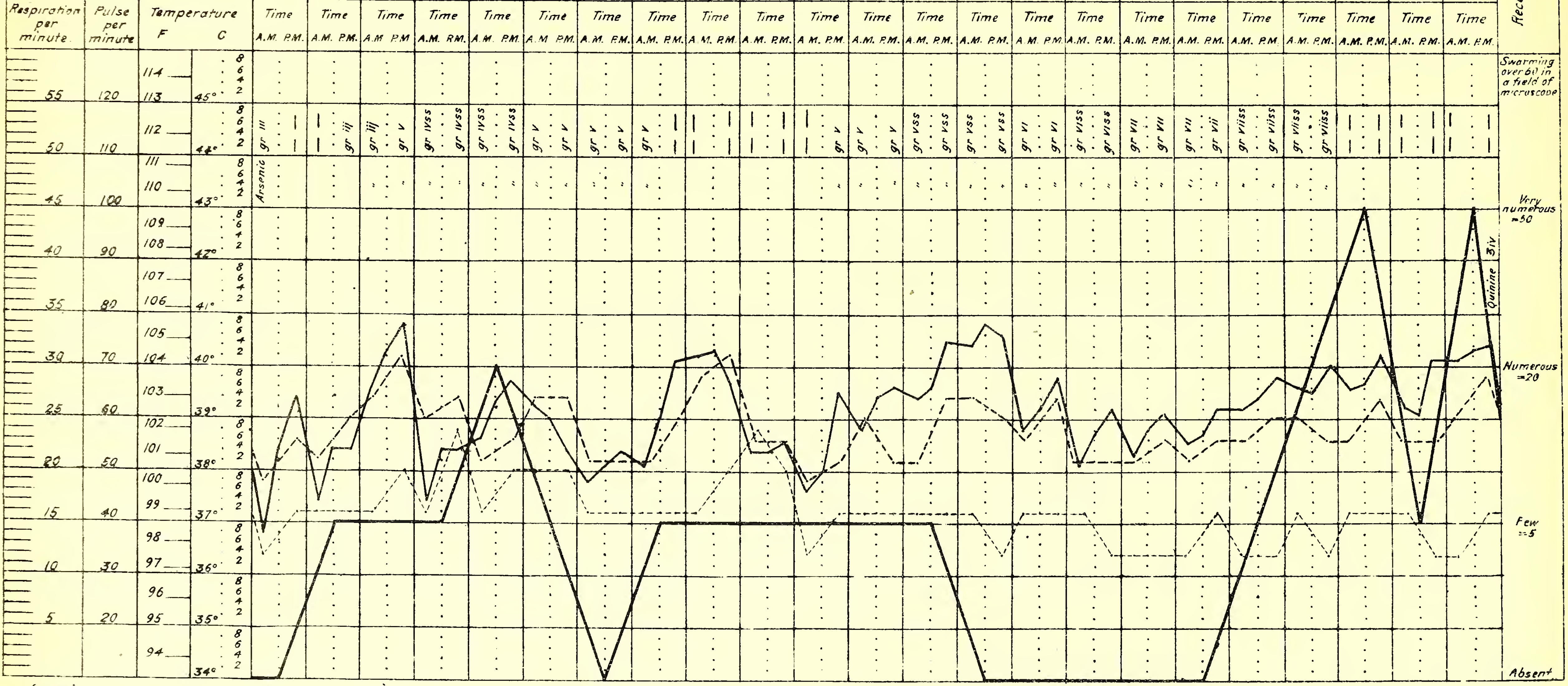
Hœmatozoon Curve ————
Temperature........ ————

Drawn & Litho: Govt Photozinco: Office, Poona 1893.

Pulse........ — — — — —
Respiration ....

Disease, ______ Date of ______ Result, ______ Date of Result, ______ Register No. LXXXI.

Dates of Observation.	1893 Jany 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Days of Disease	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37
Organisms, in Blood.	—	F	F	F	N	F	—	F	F	F	F	F	F	—	—	—	—	—	F	N	VN	F	VN
Time	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.
Arsenic	gr iii	gr iij	gr iij gr v	gr ivss gr ivss	gr ivss gr ivss	gr v gr v	gr v gr v	gr v			gr v	gr v gr v	gr vss gr vss	gr vss gr vss	gr vi gr vi	gr viss gr viss	gr vii gr vii	gr vii gr vii	gr viiss gr viiss	gr viiss gr viiss			



(S.415)

Hæmatozoon Curve ———
Temperature ———

Drawn & Litho: Govt Photozinco: Office, Poona 1893.

Pulse - - - - -
Respiration ....

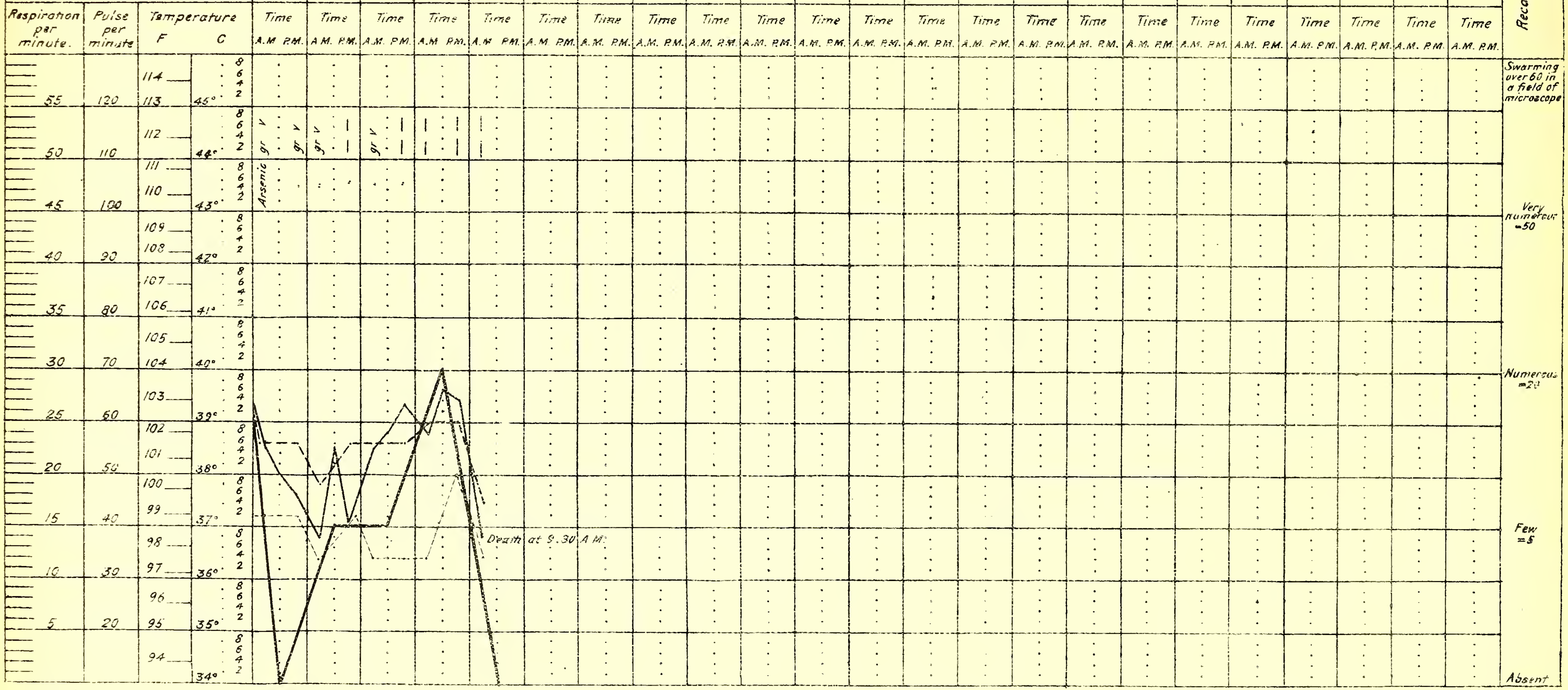
RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

_______ Age, _______ Sex, _______ Colour, _______

Disease, _______ Date of _______ Result, _______ Date of Result, _______ Register No. LXXXI

Dates of Observation.	Jan.ry 24	25	26	27	28																			Record of Organisms in Blood.
Days of Disease	38	39	40	41	42																			
Organisms in Blood.	—	F	F	N	—																			



(S. 415)

Hæmatozoon Curve ————
Temperature.. ————

Drawn & Litho: Govt Photozinco: Office, Poona 1893.

Pulse...... — — — — —
Respiration ....

CASE No. LXXXII.—BLACK AUSTRALIAN MARE, *aged 8 years*, was purchased on the 22nd December 1888 by the Bombay Tramway Company (No. 808). The animal was observed to be ailing on the 15th December 1892 and was admitted into the Infirmary on that date with a morning temperature of 37·2°C. The same temperature was maintained until the morning of the 17th when it was 37·8°C., P. 50, but fell in the evening to 37·2°C. On the morning of the 18th, 40·3°C. was registered, P. 68, and on microscopical examination of the blood the hæmatozoon of Surra was discovered. The animal was received into the Laboratory Hospital on 21st December 1892.

On admission, the mare is in fair condition. There is no fever, but the conjunctival membranes are injected and present several claret-coloured extravasations, especially invading the membranæ nictitantes of both eyes. The surface of the skin looks uneven, but there is no eruption observable. There is slight œdema about the fetlocks which are neither hot nor painful to the touch. Temp. A. M. 38°C. The pulse is fairly strong—44 beats per minute, and the respirations are 12. The appetite is good and the evacuations normal in character. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·6°C. Urine, none collected. Temp. 5 P.M. 38·2°C. P. 48. R. 20.

22nd.—The condition of the animal is unchanged. Temp. A.M. 39°C. P. 52 R. 12. The hæmatozoa are numerous in the blood. Temp. 1 P. M. 39·8°C. Urine, none collected. Temp. 5 P.M. 40·1°C. P. 64. R. 20.

23rd.—The general condition of the animal is unchanged. Temp. A. M. 39·6°C. P. 64. R. 20. The hæmatozoa are few in the blood. Temp. 1 P M. 40·4°C. Urine, none collected. Eight grains of Arsenic were given in the drinking water during the twenty-four hours. Temp 5 P.M. 40·6°C. P. 64. R. 28.

24th.—The general condition of the animal is unchanged. Temp. A.M. 39·6°C. P. 64. R. 20. The hæmatozoa are few in the blood. Temp. 1 P.M. 39·5°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,032, alkaline, contains no albumen; crystals of Carbonate and Oxalate, no casts. Eight grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 39·6°C. P. 64. R. 24.

25th.—The animal presents a bright appearance. The visible mucous membranes are clean. There are two petechiæ visible on the right conjunctiva, but the left one is free. The swelling and œdema of the hind extremities has increased and now involves the hocks. The pulse is frequent—64, the vessel cord-like under the fingers, and the beat is strong and regular, the respirations 16. Appetite good. Temp. A.M. 38·4°C. The hæmatozoon is absent from the blood. Temp. 1 P.M. 39°C. Urine, turbid, viscid, greenish-orange in colour, Sp. Gr. 1,032, alkaline, contains no albumen or casts, but Carbonate of Calcium crystals. Nine grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 39·1°C. P. 64. R. 24.

26th.—The condition of the animal is unchanged. Temp. A.M. 37·8°C. P. 60. R. 16. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·3°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,032, alkaline, contains no albumen. Nine grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·7°C. P. 52. R. 16.

27th.—The general condition of the animal is unchanged. The visible mucous membranes are clean. There are no petechiæ on the conjunctival membranes. There is slight œdema of the hind limbs below the hocks. The pulse is regular and normal in frequency 36. Respirations 12—tranquil. Temp. A.M. 38·1°C. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·8°C. Urine, turbid, viscid, brown in colour, Sp. Gr. 1,036, alkaline, contains no albumen. Ten grains of Arsenic were given during the twenty-four hours. Exercised morning and evening. Temp. 5 P.M. 38·6°C. P. 52. R. 12.

28th.—The condition of the animal is unchanged. Temp. A.M. 38·2°C. P. 44. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,034, alkaline, contains no albumen. Ten grains of Arsenic were given during the twenty-four hours. Exercised morning and evening. Temp. 5 P.M. 38·5°C. P. 56. R. 16.

29th.—The condition of the animal is unchanged. Temp. A.M. 38·2°C. P. 56. R. 16. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·2°C. Urine, turbid, viscid, greenish-orange in colour, Sp. Gr. 1,034, alkaline, contains no albumen. Ten grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·4°C. P. 52. R. 20.

30th.—The condition of the animal is unchanged. Temp. A.M. 38°C. P. 48. R. 16. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·4°C. Urine, turbid, viscid, greenish-yellow in colour, Sp. Gr. 1,032, alkaline, contains no albumen. Eight grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·1°C. P. 52. R. 12.

31st.—This morning the animal presents a bright appearance, the visible mucous membranes are clean and the conjunctivæ are free from petechiæ. The pulse is frequent—52, but strong and regular. Respirations 12. The œdema of the hind limbs has increased, especially below the hocks. The appetite is very good and the fæces natural in character. Temp. A.M. 37·8°C. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,032, alkaline, contains no albumen. Six grains of Arsenic were given during the twenty-four hours. The animal was exercised for 10 minutes in the night and morning. Temp. 5 P.M. 38·3°C P. 52. R. 12.

1st *January* 1893.—Condition unchanged. Temp. A.M. 37·7° C. P. 48. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·1°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,028, alkaline, contains no albumen. Three grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·4°C. P. 52. R. 16.

2*nd*.—Condition unchanged. Temp. A.M. 38°C. P. 48. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·8°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,025, alkaline, contains no albumen. Three grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·2°C. P. 48. R. 16.

3*rd*.—Condition unchanged. Temp. A.M. 38°C. P. 44. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·2°C. Urine, turbid, viscid, creamy-yellow in colour, Sp. Gr. 1,034, alkaline, contains no albumen. Seven grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·2°C. P. 48. R. 16.

4*th*.—The condition of the animal is unchanged. Temp. A.M. 37·5°C. P. 44. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38°C. Urine, turbid, viscid, yellowish-green in colour, Sp. Gr. 1,026, alkaline, contains no albumen. Eight grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·1°C. P. 48. R. 20.

5*th*.—The condition of the animal is unchanged. Temp. A.M. 38·3°C. P. 48. R. 16. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·3°C. Urine, turbid, viscid, yellowish-green in colour, Sp. Gr. 1,034, alkaline, contains no albumen, crystals. Ten grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·4°C. P. 64. R. 16.

6*th*.—The condition of the animal is unchanged. Temp. A.M. 38·1°C. P. 40 R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·3°C. Urine, turbid, viscid, yellowish-green in colour, Sp. Gr 1,030, alkaline, faint trace of albumen. Ten grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·5°C. P. 48. R. 12.

7*th*.—The condition of the animal is unchanged. Temp. A.M. 38°C. P. 44. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·5°C. Urine, turbid viscid, yellowish-green in colour, Sp. Gr. 1,028, alkaline, contains no albumen. Ten grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·4°C. P. 48. R. 16.

8*th*.—The general condition of the animal is unchanged. Temp. A.M. 38°C. P. 48. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·6°C. Urine, turbid, viscid, green in colour, Sp. Gr. 1,048, alkaline, contains no albumen. Ten grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·1°C. P. 44. R. 12.

9*th*.—The condition of the animal is unchanged. Temp. A.M. 38·1°C. P. 44. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·2°C. Urine, turbid, viscid, yellowish-green in colour, Sp. Gr. 1,032, alkaline, contains albumen $\frac{1}{33}$rd. Ten grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·3°C. P. 48. R. 12.

10*th*.—The condition of the animal is unchanged. Temp. A.M. 38°C. P. 48. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38°C. Urine, turbid, viscid, yellowish-green in colour, Sp. Gr. 1,028, alkaline, contains no albumen. Ten grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 37·7°C. P. 52. R. 20.

11*th*.—The condition of the animal is unchanged. Temp. A.M. 37·1°C. P. 44. R. 16 The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·2°C. Urine, turbid, viscid, yellowish-green in colour, Sp. Gr. 1,024, alkaline, contains no albumen. Eleven grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·3°C. P. 48. R. 16.

12*th*.—The condition of the animal is unchanged. Temp. A.M. 38·2°C. P. 44. R. 8. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·8°C. Urine, turbid, viscid, yellowish-green in colour, Sp. Gr. 1,027, alkaline, contains no albumen. Eleven grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·4°C. P. 48. R. 12.

13*th*.—The condition of the animal is unchanged. Temp. A.M. 36·7°C. P. 48. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38°C. Urine, turbid, viscid, yellowish-green in colour, Sp. Gr. 1,024, alkaline, contains no albumen. Eleven grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·1°C. P. 48. R. 12.

14*th*.—The condition of the animal is unchanged. Temp. A.M. 38°C. P. 52. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·6°C. Urine, turbid, viscid, yellowish-green in colour, Sp. Gr. 1,026, alkaline, contains no albumen. Eleven grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 37·7°C. P. 52. R. 12.

15*th*.—The condition of the animal is unchanged. Temp. A.M. 37·2°C. P. 44. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38°C. Urine, turbid, viscid, yellowish-green in colour, Sp. Gr. 1,020, alkaline, contains no albumen. Eleven grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 37 8°C. P. 48. R. 16.

16*th*.—The condition of the animal is unchanged. Temp. A.M. 37·7°C. P. 48. R. 12. The hæmatozoon is absent from the blood Temp. 1 P.M. 37·7°C. Urine, turbid, viscid, green in colour, Sp. Gr. 1,030, alkaline, contains no albumen. Eleven grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38°C. P. 48. R. 12.

17*th.*—The condition of the animal is unchanged. Temp. A.M. 37·3°C. P. 40. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·1°C. Urine, turbid, viscid, green in colour, Sp. Gr. 1,024, alkaline, contains no albumen. Twelve grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 37·8°C. P. 52. R. 12.

18*th.*—The condition of the animal is unchanged. Temp. A.M. 37°C. P. 44. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·2°C. Urine, turbid, viscid, green in colour, Sp. Gr. 1,030, alkaline, contains no albumen. Twelve grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·1°C. P. 44. R. 12.

19*th.*—The animal presents a bright appearance, and the swelling and œdema below the hocks, which has been a marked symptom for so long a period, is now decreasing in amount. The visible mucous membranes are clean and the conjunctivæ although somewhat injected are free from petechiæ. The pulse is somewhat frequent but strong and regular, and of low tension. The breathing is tranquil and the respirations normal in number. The appetite is good and the evacuations natural in character. Temp. A.M. 38°C. P. 44. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·1°C. Urine, turbid, viscid, greenish-dark-brown in colour, Sp. Gr. 1,024, alkaline, contains albumen $\frac{1}{34}$th; also a few blood, epithelial and granular casts, together with a trace of bile pigment. Ten grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 37·8°C. P. 44. R. 12.

20*th.*—The condition of the animal is unchanged. Temp. A.M. 36·7°C. P. 40. R. 8. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·7°C. Urine, turbid, viscid, green in colour, Sp. Gr. 1,024, alkaline, contains no albumen. Twelve grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·1°C. P. 48. R. 12.

21*st.*—The condition of the animal is unchanged. Temp. A.M. 38·2°C. P. 48. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·2°C. Urine, turbid, viscid, green, Sp. Gr. 1,016, alkaline, contains no albumen. Twelve grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·1°C. P. 48. R. 12.

22*nd.*—The condition of the animal is unchanged. Temp. A.M. 38°C. P. 44. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·1°C. Urine, turbid, viscid, green in colour, Sp. Gr. 1,022, alkaline, contains no albumen. Twelve grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38°C. P. 48. R. 12.

23*rd.*—The condition of the animal is unchanged. Temp. A.M. 37·6°C. P. 44. R. 8. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38°C. Urine, turbid, viscid, green in colour, Sp. Gr. 1,020, alkaline, contains no albumen. Twelve grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 37·3°C. P. 48. R. 12.

24*th.*—The animal presents a bright appearance. The visible mucous membranes are clear but there are a few petechiæ on the conjunctivæ. The pulse is regular and somewhat frequent; it is, however, hard, and of high tension. The respirations are normal. There is now little or no œdema of the hind limbs or abdomen. The appetite is very good and the evacuations natural in appearance. Temp. A.M. 37·6°C. P. 44. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38°C. Urine, turbid, viscid, greenish-brown in colour, Sp. Gr. 1,024, alkaline, contains no albumen. Twelve grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 37·3°C. P. 48. R. 12.

25*th.*—The condition of the animal is unchanged. Temp. A.M. 37·6°C. P. 44. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38°C. Urine, turbid, viscid, green in colour, Sp. Gr. 1,022, alkaline, contains no albumen. Twelve grains of Arsenic were given during the twenty-four hours. The animal was exercised in the morning and evening. Temp. 5 P.M. 38°C. P. 44. R. 12.

26*th.*—The condition of the animal is unchanged. Temp. A.M. 38°C. P. 48. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·2°C. Urine, turbid, viscid, green in colour, Sp. Gr. 1,018, alkaline, contains no albumen. Twelve grains of Arsenic were given during the twenty-four hours. The animal was exercised in the morning and evening. Temp. 5 P.M. 37·7°C. P. 52. R. 8.

27*th.*—The condition of the animal is unchanged. Temp. A.M. 38·1°C. P. 44. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·5°C. Urine, turbid, viscid, green in colour, Sp. Gr. 1,018, alkaline, contains no albumen. Twelve grains of Arsenic were given during the twenty-four hours. The animal was exercised morning and evening. Temp. 5 P.M. 38·2°C. P. 52. R. 12.

28*th.*—The condition of the animal is unchanged. Temp. A.M. 37·2°C. P. 48. R. 8. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·4°C. Urine, turbid, viscid, green in colour, Sp. Gr. 1,020, alkaline, contains no albumen. Ten grains of Arsenic were given during the twenty-four hours. The animal was exercised in the morning and evening. Temp. 5 P.M. 39°C. P. 52. R. 12.

29*th.*—The condition of the animal is unchanged. Temp. A.M. 38°C. P. 44. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·4°C. Urine, turbid, viscid, green in colour, Sp. Gr. 1,022, alkaline, contains no albumen. Ten grains of Arsenic were given during the twenty-four hours. The animal was exercised in the morning and evening. Temp. 5 P.M. 37·6°C. P. 52. R. 12.

30*th.*—The condition of the animal is unchanged. Temp. A.M. 38°C. P. 48. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·2°C. Urine, turbid, viscid, yellowish-green in colour, Sp. Gr. 1,020, alkaline, contains no albumen. Ten grains of Arsenic were given during the twenty-four hours. The animal was exercised in the morning and evening. Temp. 5 P.M. 38·3°C. P. 56. R. 12.

31*st.*—The condition of the animal is unchanged. Temp. A.M. 37·3°C. P. 48. R. 8. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·7°C. Urine, turbid, yellowish-green in colour, Sp. Gr. 1,018, alkaline, contains no albumen. Ten grains of Arsenic were given during the twenty-four hours. The animal was exercised in the morning and evening. Temp. 5 P.M. 38·5°C. P. 60. R. 12.

1*st February.*—The condition of the animal is unchanged. Temp. A.M. 37·2°C. P. 44. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·7°C. Urine, turbid, viscid, greenish-yellow in colour, Sp. Gr. 1,028, alkaline, contains no albumen. Eight grains of Arsenic were given during the twenty-four hours. The animal was exercised in the morning and evening. Temp. 5 P.M. 37·6°C. P. 52. R. 8.

2*nd.*—The condition of the animal is unchanged. Temp. A.M. 38·1°C. P. 52. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38°C. Urine, turbid, yellow in colour, Sp. Gr. 1,028, alkaline, contains no albumen. Eight grains of Arsenic were given during the twenty-four hours. The animal was exercised in the morning and evening. Temp. 5 P.M. 37·6°C. P. 48. R. 10.

3*rd.*—The condition of the animal is unchanged. Temp. A.M. 37·7°C. P. 48. R. 8. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·3°C. Urine, turbid, yellow in colour, Sp. Gr. 1,026, alkaline, contains no albumen. Nine grains of Arsenic were given during the twenty-four hours. The animal was exercised in the morning. Temp. 5 P.M. 38·6°C. P. 56. R. 16.

4*th.*—The condition of the animal is unchanged. Temp. A.M. 37·5°C. P. 48. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·1°C. Urine, turbid, greenish-yellow in colour, Sp. Gr. 1,030, alkaline, contains no albumen. Nine grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·7°C. P. 60. R. 12.

5*th.*—The condition of the animal is unchanged. Temp. A.M. 37·6°C. P. 48. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·1°C. Urine, turbid, yellow in colour, Sp. Gr. 1,032, alkaline, contains no albumen. Eight grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·2°C. P. 56. R. 8.

6*th.*—The condition of the animal is unchanged. Temp. A.M. 38°C. P. 56. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·7°C. Urine, turbid, yellow in colour, Sp. Gr. 1,030, alkaline, contains no albumen. Eight grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·1°C. P. 52. R. 12.

7*th.*—The condition of the animal is unchanged. Temp. A.M. 37·8°C. P. 56. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·3°C. Urine, turbid, yellow in colour, Sp. Gr. 1,037, alkaline, contains no albumen. Eight grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38°C. P. 52. R. 12.

8*th.*—The condition of the animal is unchanged. Temp. A.M. 37·5°C. P. 52. R. 8. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·7°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,036, alkaline, contains no albumen. Eight grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38°C. P. 60. R. 12.

9*th.*—The condition of the animal is unchanged. Temp. A.M. 36·7°C. P. 48. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·6°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,033, alkaline, contains no albumen. Eight grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 37·5°C. P. 56. R. 12.

10*th.*—The condition of the animal is unchanged. Temp. A.M. 36·7°C. P. 48. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·8°C. Urine, turbid, viscid, greenish-yellow in colour, Sp. Gr. 1,043, alkaline, contains no albumen. Eight grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·1°C. P. 52. R. 12.

11*th.*—The condition of the animal is unchanged. Temp. A.M. 37·7°C. P. 64. R. 20. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·3°C. Urine, turbid, orange-yellow in colour, Sp. Gr. 1,032, alkaline, contains no albumen. Eight grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·4°C. P. 52. R. 12.

12*th.*—The condition of the animal is unchanged. Temp. A.M. 36·2°C. P. 40. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 36·8°C. Urine, turbid, yellow in colour, Sp. Gr. 1,012, alkaline, contains no albumen. Eight grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 37·3°C. P. 56. R. 8.

13*th.*—There is some swelling and œdema of the lower half of the hind limbs; otherwise the condition is unchanged. Temp. A.M. 37·1°C. P. 48. R. 8. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38°C. Urine, turbid, yellow in colour, Sp. Gr. 1,030, alkaline, contains no albumen. Eight grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 37·6°C. P. 52. R. 12.

14th.—The condition of the animal is unchanged. Temp. A.M. 36·8°C. P. 48. R. 8. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·4°C. Urine, turbid, yellow in colour, Sp. Gr. 1,032, alkaline, contains a trace of albumen. Eight grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38°C. P. 52. R. 12.

15th.—The condition of the animal is unchanged. Temp. A.M. 35·8°C. P. 40. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·5°C. Urine, clear, pale yellow in colour, Sp. Gr. 1,010, alkaline, contains no albumen. Eight grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·8°C. P. 56. R. 16.

16th.—The condition of the animal is unchanged. Temp. A.M. 37·1°C. P. 48. R. 8. The hæmatozoon is absent from the blood. Temp. 1. P.M. 33°C. Urine, turbid, yellow in colour, Sp. Gr. 1,020, alkaline, contains no albumen. Eight grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·4°C. P. 56. R. 16.

17th.—The condition of the animal is unchanged. Temp. A.M. 36·6°C. P. 48. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·2°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,028, alkaline, contains no albumen. Four grains of Arsenic were given in the morning. The treatment is to be abandoned from this date. Temp. 5 P.M. 38·1°C. P. 52. R. 16.

18th.—The condition of the animal is unchanged. Temp. A.M. 36°C. P. 40. R. 8. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·4°C. Urine, passed but none collected. No Arsenic was given to-day. Temp. 5 P.M. 38·3°C. P. 52. R. 12.

19th.—The condition of the animal is unchanged. Temp. A.M. 37·4°C. P. 48. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·7°C. Urine, turbid, bright-yellow in colour, Sp. Gr. 1,026, alkaline, contains no albumen. No Arsenic was given to the animal. Temp. 5 P.M. 38·2°C. P. 52. R. 12.

20th.—The animal is now beginning to lose condition rapidly. Temp. A.M. 36·6°C. P. 44. R. 8. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37°C. Urine, turbid, yellow in colour, Sp. Gr. 1,012, alkaline, contains no albumen. Temp. 5 P.M. 38·7°C. P. 52. R. 12.

21st.—The animal is fairly strong and is able to walk about its loose box, but daily appears to be more and more tucked up. The appetite is very good. Temp. A.M. 35·5°C. P. 44. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·1°C. Urine, passed but none collected. Temp. 5 P.M. 36·8°C. P. 52. R. 12.

22nd.—The condition of the animal is unchanged. Temp. A.M. 36·7°C. P. 56. R. 8. The hæmatozoon is absent. Temp. 1 P.M. 37·7°C. Urine, turbid, yellow in colour, Sp. Gr. 1,012, alkaline, contains no albumen. Temp. 5 P.M. 37·6°C. P. 56. R. 12.

23rd.—The condition of the animal is unchanged. Temp. A.M. 37·6°C. P. 44. R. 12. The hæmatozoon is absent. Temp. 1 P.M. 37·8°C. Urine, passed but none collected. Temp. 5 P.M. 38·2°C. P. 52. R. 12.

24th.—The condition of the animal is unchanged. Temp. A.M. 37·6°C. P. 48. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 39·1°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,028, alkaline, contains no albumen. Temp. 5 P.M. 39°C. P. 52. R. 12.

25th.—The condition of the animal is unchanged. Temp. A.M. 36·3°C. P. 52. R. 12. The hæmatozoon is absent. Temp. 1 P.M. 38°C. Urine, turbid, like Porter, Sp. Gr. 1,020, alkaline, contains albumen ⅛th. Temp. 5 P.M. 39·1°C. P. 64. R. 12.

26th.—This morning the animal is very weak, the hind limbs appear to have lost power. Temp. A.M. 37·6°C. P. 64. R. 12. The hæmatozoon is absent. Temp. 1 P.M. 37·1°C. Urine, turbid, viscid, like Porter, Sp. Gr. 1,030, alkaline, contains albumen ¼th. At 1 P.M. the animal lay down and was unable to regain the upright position. Temp. 5 P.M. 38·8°C. P. 96. R. 28.

Death occurred at 5-30 P.M.

AUTOPSY.—The body is emaciated. There is no swelling or œdema of the extremities or the under-surface of the abdomen.

Thorax.—The pleural cavities each contains thirty ounces of a dark blood-stained fluid, but there are no pleuritic adhesions.

Right lung.—There are a few sub-pleural ecchymoses dotted over the surface of the organ. The right lobule is the seat of a localized emphysema. *On section*, the tissues present a healthy appearance. *Left lung.*—A few sub-pleural ecchymoses dotted over the surface. The lobule is the seat of early consolidation, the lobules being separated by yellow-coloured exudation. The base presents a patch 8″ × 7″ × 4″, the seat of consolidation, the lobules of which, on section, are found to be divided off by the same kind of exudation as that observed at the apex. The middle portion of the organ is well filled with air, and the tissues appear healthy.

The cavity of the *pericardium* contains 6 ozs. of a dark-red coloured fluid.

Heart weighs 5 lbs. 10 ozs. The *external* surface of the organ is free from sub-pericardial ecchymoses with the exception of the *right auricle* which is the seat of numerous small circular spots of a dark-purple colour. *On section*—all the lining membranes of cavities are found to be more or less blood-stained, but the *Right Ventricle*, in addition, presents a few small sub-endocardial extravasations. The valves present a healthy appearance.

The *abdominal cavity* contains forty ounces of a dark, blood-stained fluid, but on microscopical examination the Surra hæmatozoon was found to be absent from it.

Liver is small, weighs only 7 lbs. 6 ozs. The capsule presents signs of old perihepatitis, but on section the tissues appear healthy.

Spleen weighs 1 lb. 15½ ozs. There are numerous small sub-capsular petechiæ of a bright-red colour. *On section*—the tissues are dark in colour, but firm in consistency.

Kidneys.—Both organs are of the same weight, 1 lb. 8½ ozs. There are no petechiæ visible on the cortical surface, and *on section* the tissues present a normal appearance.

Stomach.—The organ is somewhat distended with semi-digested food. The *cuticular* portion is healthy in appearance. The mucous membrane of the *villous* portion presents a healthy appearance, but there is a raised tumor of the size of a walnut lying at the fundus of the organ half an inch from the line of demarcation. *On section,* the tumor contains numerous specimens of the *Spiroptera megastoma.*

The *Small* and *Large Intestines* present a healthy appearance and although carefully looked for, no parasites were found.

Bladder contains 22 ozs. of a dark, blood-stained viscid fluid, Sp. Gr. 1,034. The mucous membrane of the organ is healthy in appearance.

Remarks.—This animal, a Black Australian Mare, aged 8 years, was purchased on the 22nd December 1888; was observed to be ailing on the 15th December 1892, and the hæmatozoon was discovered in the blood on the 18th December. The animal came under observation at the Laboratory Hospital on the 21st December and was then in fair condition although several claret-coloured extravasations were present on the membranæ nictitantes, and there was some œdema about the fetlocks. On the following morning the hæmatozoa were numerous in the blood, but as on the following day they were decreased in number, a treatment consisting of Arsenic in the form of Liq. Arsenicalis was commenced and continued until the morning of the 17th February 1893, the 67th day of the disease. The hæmatozoon was present in the blood for six days out of a period of seventy-one.

The temperature on the evening of the 17th December 1892 was 37·2°C., but by the following morning had risen to 40·3°C. and remained elevated until the evening of the 20th when it fell, and was 37·6°C. on the morning of the 21st. It again rose and attained normal limits on the 26th. From this latter date until February 24th the temperature only reached 39°C. on one occasion, *viz.*, on the evening of 28th January 1893.

The urine on the 25th December was found on microscopical examination to contain a few blood casts and numerous Carbonate crystals, and a few days later a small quantity of bile pigment was discovered. On the 17th January 1893 a few granular casts were found in addition to the blood casts, and these remained present during the whole duration of the case. Albumen was found varying from a trace to $\frac{1}{33}$rd on three occasions only, *viz.*, on the 6th, 9th and 13th of January 1893, but on the 25th and 26th of February, the day previous to and that on which death occurred, the urine suddenly became dark-red in colour, but on microscopical examination no casts or blood corpuscles could be discovered. Death occurred on the 26th February, the 71st day of the disease. Two Guinea-pigs were inoculated with 0·5 C.C. of blood taken from the Jugular Vein on 17th February, the hæmatozoon at the time of inoculation having been absent from the blood for 55 days.

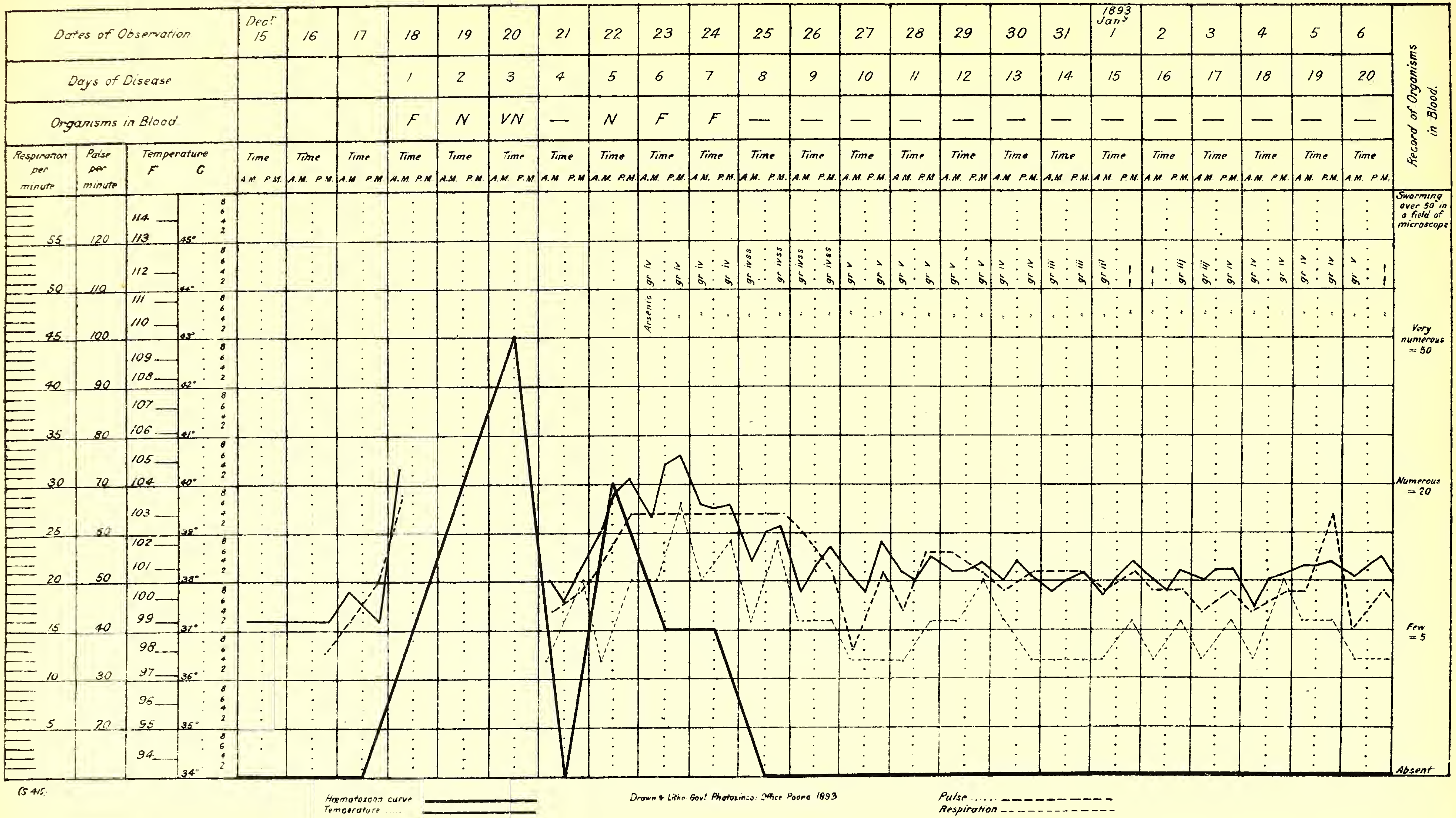
RECORDS OF URINE.

Animal, Black Australian Mare No. LXXXII. Date, December 1892. Disease, Surra naturally contracted.

Date.	Quantity.	Colour.	Re-action.	Specific Gravity.	Albumen.	Phosphates.	Remarks.
1892.							
December 24 ...	...	Turbid, viscid, yellow.	Alkaline. ...	1,032	Nil ...	Nil ...	A few blood casts and large number of calcium carbonate crystals.
25 ...	...	Turbid, viscid, greenish-orange.	Do. ...	1,030	Nil ...	Nil ...	Few blood casts, numerous calcium carbonate crystals.
26 ...	...	Turbid, viscid, orange.	Do. ...	1,032	Nil ...	Nil ...	Do. do.
27 ...	...	Turbid, viscid, brown.	Do. ...	1,036	Nil ...	Nil ...	Do. do.
28 ...	...	Turbid, viscid, orange.	Do. ...	1,034	Nil ...	Nil ...	Trace of bile pigment; calcium carbonates, a few oxalates; few granular casts.
29 ..	...	Turbid, viscid, greenish-orange.	Do. ...	1,034	Nil ..	Nil ...	Do. do.
30 ...	...	Do. ...	Do. ...	1,032	Nil ...	Nil ...	Bile pigment absent; calcium carbonates.
31 ...	...	Turbid, viscid, orange.	Do. ...	1,032	Nil ...	Nil ...	

Black Australian Mare (No. 808, Bombay Tramway Company) —— Age, 8 —— Sex, Mare. —— Colour, Black ——

Disease, Naturally contracted "Surra" —— Date of Attack, 18. 12. 92 —— Result, Death —— Date of Result, 26. 2. 93. —— Register No. LXXXII. ——



(S 415)

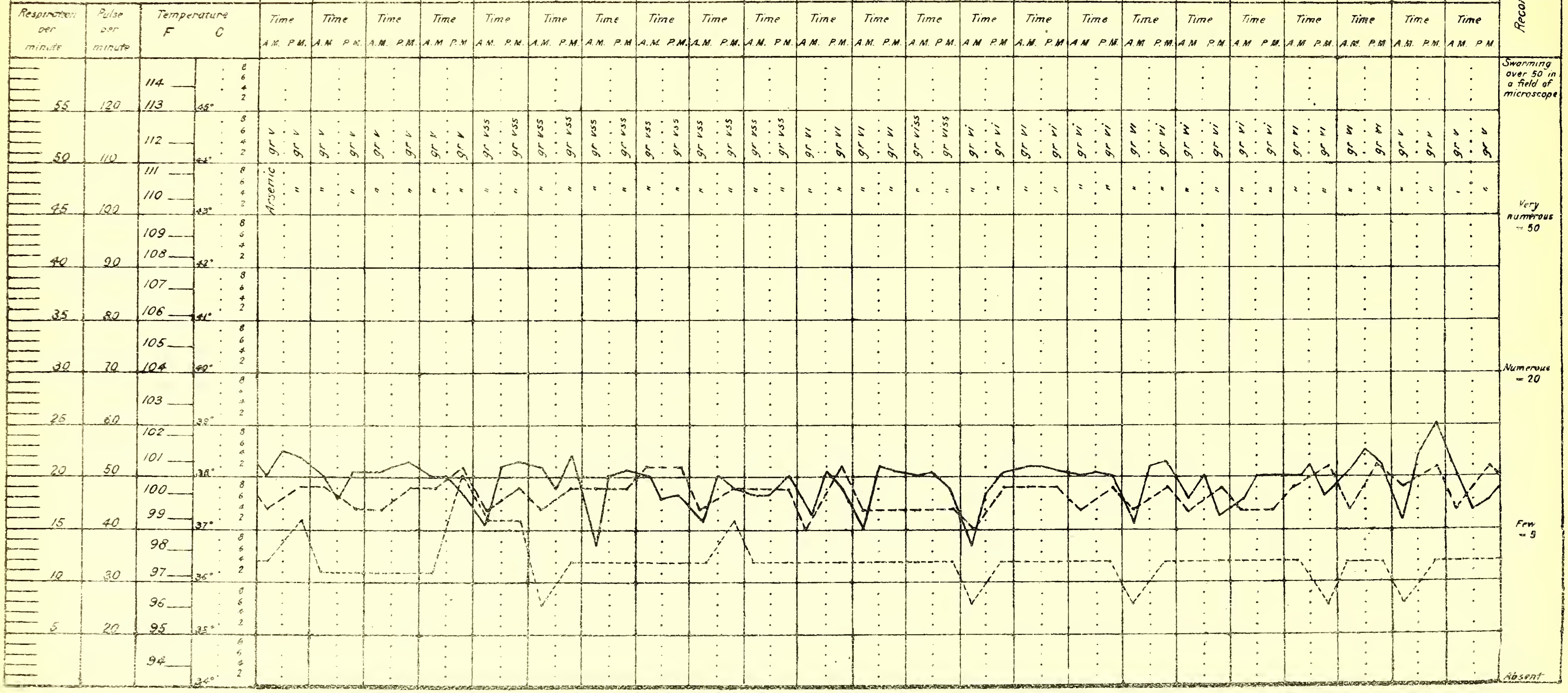
Drawn & Litho. Gov.t Photozinco: Office Poona 1893

Age______ Sex ______ Colour______

Age _____ Sex _____ Colour _____

Disease _____ Date of _____ Result _____ Date of Result _____ Register No. LXXXII.

Dates of Observation.	Jan'y 7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
Days of Disease	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43
Organisms in Blood	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.
	gr v gr v	gr v gr v	gr v gr v	gr v gr v	gr vss gr vss	gr vss gr vss	gr vss gr vss	gr vss gr vss	gr vss gr vss	gr vss gr vss	gr vi gr vi	gr vi gr vi	gr viss gr viss	gr vi gr vi	gr vi gr vi	gr vi gr vi	gr vi gr vi	gr vi gr vi	gr vi gr vi	gr vi gr vi	gr vi gr vi	gr v gr v	gr v gr v
	Arsenic "	" "	" "	" "	" "	" "	" "	" "	" "	" "	" "	" "	" "	" "	" "	" "	" "	" "	" "	" "	" "	" "	" "



(S +5)

Hæmatozoon curve
Temperature

Drawn & Litho. Govt. Photozinco. Office Poona 1893

Pulse
Respiration

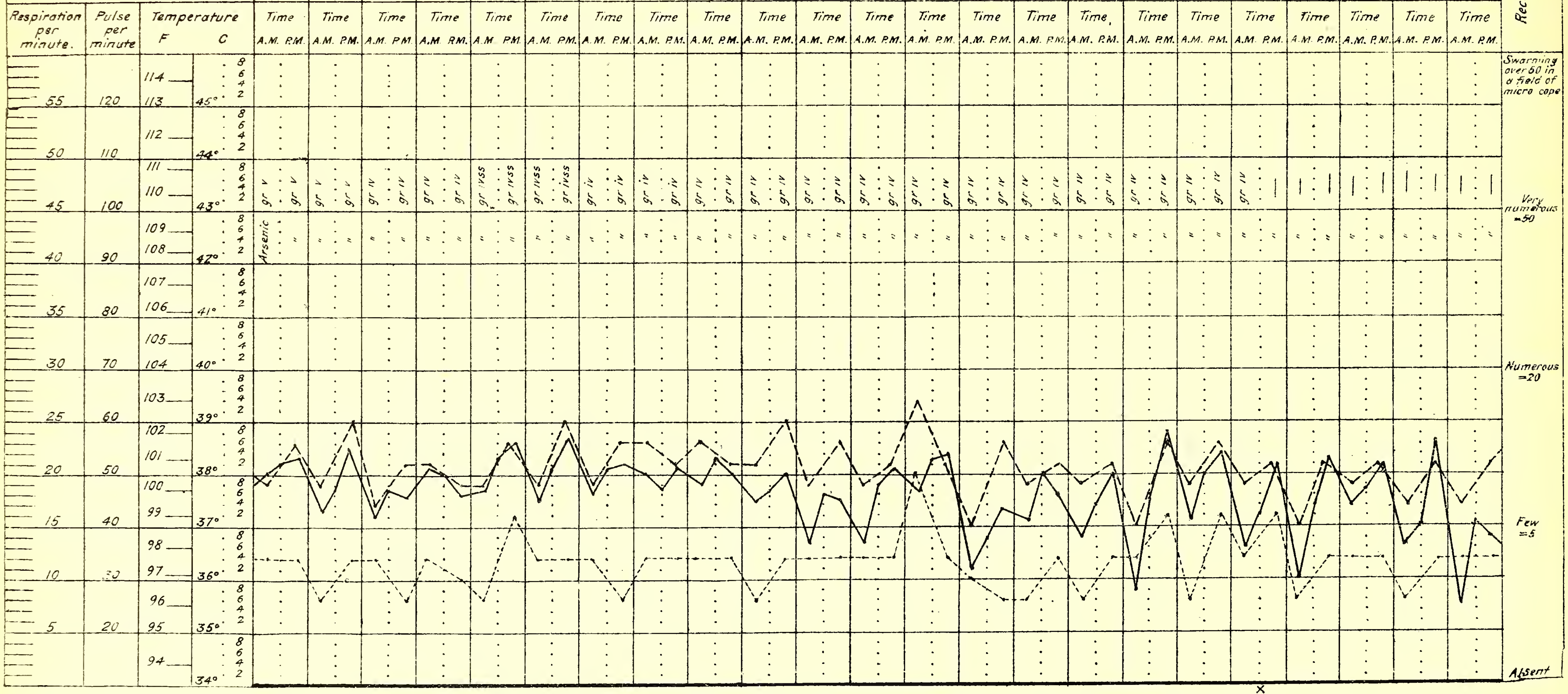
Age, Sex, Colour,

Result Date of Result Register No. LXXXII

Age, ______ Sex, ______ Colour, ______

Disease, ______ Date of ______ Result, ______ Date of Result, ______ Register No. LXXXII ______

Dates of Observation.	Jan. 30	31	Feb. 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Days of Disease	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66
Organisms in Blood.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—



(S.415)

Hæmatozoon Curve
Temperature

Drawn & Litho: Govt Photozinco: Office, Poona 1893.

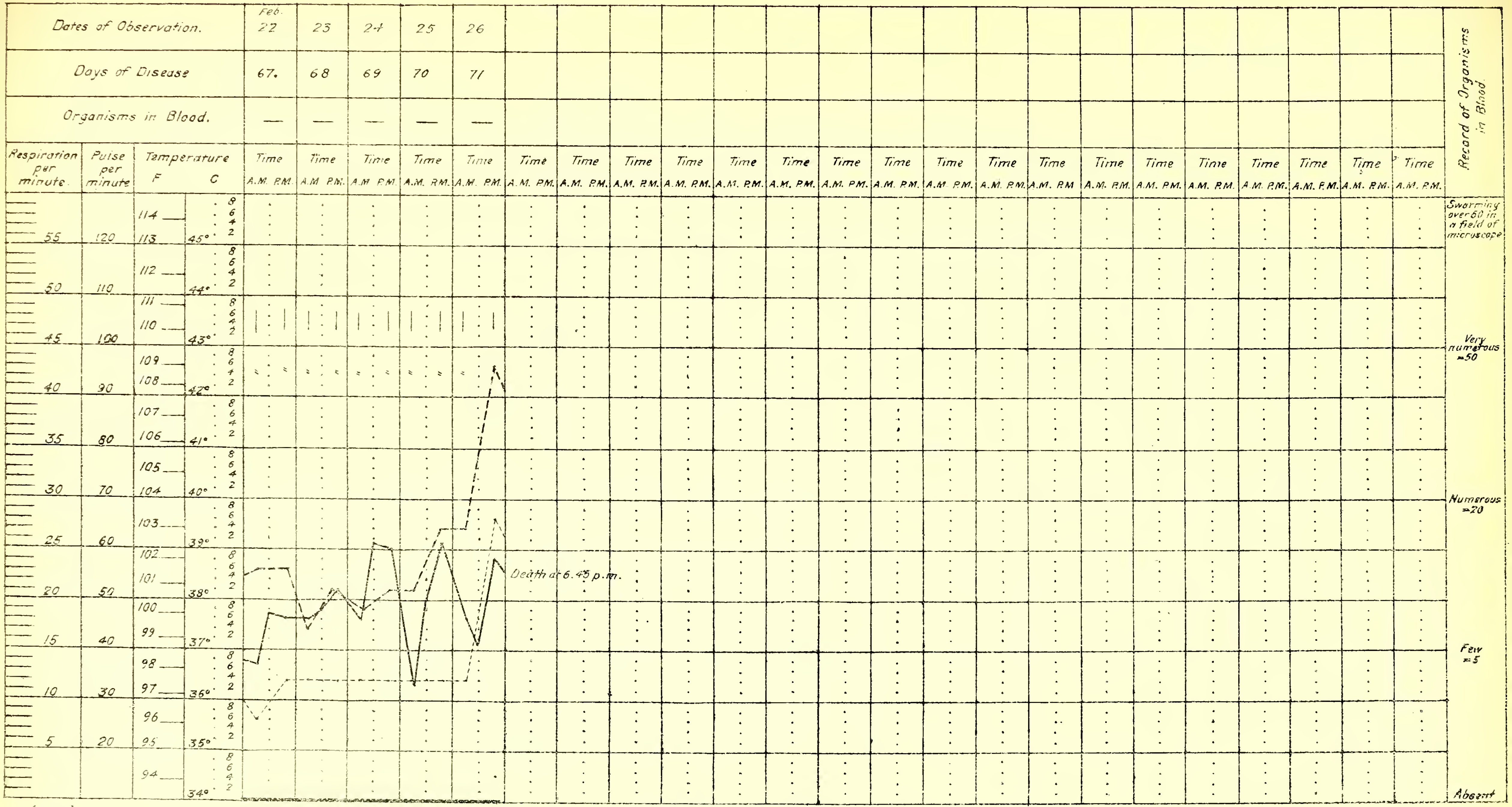
Pulse
Respiration

X 17.2.93. Two Guinea Pigs inoculated (i) 0·5 c.c. of Blood. Hæmatozoon. nil
(ii) 0.5 c.c. " " nil

Age. Sex. Colour.

Date of Result, Date of Result, Register No. LXXXII

Disease, ______ Date of ______ Result, ______ Date of Result, ______ Register No. LXXXII



(S. 415)

Hæmatozoan Curve
Temperature

Drawn & Litho: Govt Photozinco: Office, Poona 1893.

Pulse
Respiration

Date.	Quantity.	Colour.	Re-action.	Specific Gravity.	Albumen.	Phosphates.	Remarks
1893.							
January 1	...	Turbid, viscid, yellow.	Alkaline	1,028	Nil	Nil	Bile pigment absent ; calcium carbonates.
2	...	Do.	Do.	1,025	Nil	Nil	Do. do.
3	...	Turbid, viscid, creamy-yellow.	Do.	1,034	Nil	Nil	Do. do.
4	...	Turbid, viscid, yellowish green.	Do.	1,026	Nil	Nil	Do. do.
5	...	Do.	Do.	1,034	Nil	Nil	Do. do.
6	...	Do.	Do.	1,030	A trace.	Nil	Do. do.
7	...	Do.	Do.	1,028	Nil	Nil	Do. do.
8	...	Turbid, viscid, green.	Do.	1,048	Nil	Nil	Few blood casts and leucocytes'; numerous calcium carbonates ; a few oxalates
9	...	Turbid, viscid, yellowish green.	Do.	1,032	$\frac{1}{33}$rd	Nil	Do. do.
10	...	Do.	Do.	1,028	Nil	Nil	Do. do.
11	...	Do.	Do.	1,024	Nil	Nil	Do. do,
12	...	Do.	Do.	1,027	Nil	Nil	Do. do.
13	...	Do.	Do.	1,024	Nil	Nil	Do. do.
14	...	Do.	Do.	1,026	Nil	Nil	A few blood casts, some epithelium cells, very numerous forms of carbonate of lime crystals.
15	...	Do.	Do.	1,020	Nil	Nil	... ...
16	...	Turbid, viscid, green.	Do.	1,030	Nil	Nil	... ...
17	...	Do.	Do.	1,024	Nil	Nil	A few blood and granular casts, numerous calcium carbonate crystals.
18	...	Do.	Do.	1,030	Nil	Nil	Do. do.
19	...	Turbid, viscid, greenish dark-brown.	Do.	1,024	$\frac{1}{34}$th	Nil	A few blood and granular casts ; numerous calcium carbonate crystals.
20	...	Turbid, viscid, green	Do.	1,024	Nil	Nil	A few blood and granular casts. A trace of bile pigment ; numerous calcium carbonates.
21	...	Do.	Do.	1,016	Nil	Nil	Do. do.
22	...	Do.	Do.	1,022	Nil	Nil	Do. do.
23	...	Do.	Do.	1,020	Nil	Nil	Do. do,
24	...	Turbid, viscid, greenish-brown.	Do.	1,024	Nil	Nil	Do. do.
25	...	Turbid, viscid, green	Do.	1,022	Nil	Nil	Do. do.
26	...	Do.	Do.	1,018	Nil	Nil	Do. do.
27	...	Do.	Do.	1,018	Nil	Nil	Do. do.
28	...	Do.	Do.	1,020	Nil	Nil	Do. do.
29	...	Do.	Do.	1,022	Nil	Nil	Do. do.
30	...	Turbid, viscid, yellowish-green.	Do.	1,020	Nil	Nil	Do. do.
31	...	Turbid, yellowish-green.	Do.	1,018	Nil	Nil	Very few granular casts ; numerous Caco$_3$ crystals.
February 1	...	Turbid, viscid, greenish-yellow.	Do.	1,028	Nil	Nil	Do. do.
2	...	Turbid, yellow	Do.	1,028	Nil	Nil	Do. do.
3	...	Do.	Do.	1,026	Nil	Nil	Do. do.
4	...	Turbid, greenish-yellow.	Do.	1,030	Nil	Nil	Do. do.
5	...	Turbid, yellow	Do.	1,032	Nil	Nil	Do. do.
6	...	Do.	Do.	1,030	Nil	Nil	Do. do.
7	...	Do.	Do.	1,037	Nil	Nil	Do. do.
8	...	Turbid, viscid, yellow	Do.	1,036	Nil	Nil	Do. do.
9	...	Do.	Do.	1,033	Nil	Nil	Do. do.
10	...	Turbid, viscid, greenish yellow.	Do.	1,043	Nil	Nil	Do. do.
11	...	Turbid, orange-yellow	Do.	1,032	Nil	Nil	Do. do.
12	...	Turbid, yellow	Do.	1,012	Nil	Nil	Do. do.
13	...	Do.	Do.	1,030	Nil	Nil	Do. do.
14	...	Do.	Do.	1,032	Trace	Nil	Do. do.
15	...	Clear, pale-yellow	Do.	1,010	Nil	Nil	Do. do.
16	...	Turbid, yellow	Do.	1,020	Nil	Nil	Do. do.
17	...	Turbid, viscid, yellow	Do.	1,028	Nil	Nil	Do. do.
18	...	Passed	but none	collected.			
19	...	Turbid, bright yellow	Alkaline	1,026	Nil	Nil	Do. do.
20	...	Turbid, yellow	Do.	1,012	Nil	Nil	Do. do.
21	...	Passed,	but none	collected.			
22	...	Turbid, yellow	Alkaline	1,012	Nil	Nil	Do. do.
23	...	Passed,	but none	collected.			
24	...	Turbid, viscid, orange	Alkaline	1,028	Nil	Nil	Do. do.
25	...	Turbid, dark-red	Do.	1,020	$\frac{1}{8}$th	Nil	No casts ; no red blood corpuscles.
26	...	Turbid, viscid, dark-red.	Do.	1,030	$\frac{1}{4}$th	Nil	Do. do.
				Death.			

CASE No. LXXXIV.—A GREY PERSIAN GELDING *aged 8 years.* Was purchased by the Bombay Tramway Company on November 27th, 1889. (No. 62).

Previous History.—Castration was performed in December 1889. The animal has been in the Infirmary on several occasions either on account of injury or from other causes, *viz.,* for six days in March 1891, and again for five days in January 1892, with Hæmaturia.

Present Illness.—On January 19th, 1893, the animal was reported to be off its feed and this continued until the 21st, when it returned to work. Again on the 23rd the animal was off its feed. Temp. 1 P.M. 39·1°C. By 4 P.M. it registered 40·5°C., and on microscopical examination of the blood, the hæmatozoon was discovered.

25th, January 1893.—*State on Admission.*—The animal is in very good condition, and is suffering from the ordinary symptoms of fever. It appears a little dull and the skin is hot and the visible mucous membranes are injected, but there are no extravasations of blood on the conjunctivæ. There is slight œdema about the fetlocks. The pulse is strong and regular but somewhat frequent—44. The breathing is tranquil, respirations—20. The appetite is good and the evacuations healthy in character. Temp. A.M. 38·8°C. On microscopical examination the hæmatozoa are found to be very numerous in the blood, which is fairly normal in colour. The red-blood corpuscles form normal rouleaux and are individually distinct. The white corpuscles are somewhat increased in number and size; there are a few lymphoid corpuscles containing one or more nuclei and a number of small, faintly yellow, free particles or granules floating in the blood serum. The hæmatozoa are large and the wavy membrane exceedingly distinct. Temp. 1 P.M. 40·1°C. The urine is turbid, viscid, of a yellow colour, Sp. Gr. 1,022, alkaline, contains no albumen, but a few Carbonate of Lime crystals. Temp. 5 P.M. 40°C. P. 48. R. 20.

26th.—The animal presents a dull appearance. The visible mucous membranes are injected, and there are numerous, extensive, claret-coloured extravasations involving the conjunctivæ. There is slight swelling and œdema of the hind limbs and scrotum. The pulse feels like a cord under the fingers; it is frequent and the beat abrupt—48. The breathing is free, respirations 24. The appetite remains good. Temp. A.M. 39·5°C. The hæmatozoa are very numerous in the blood. Temp. 1 P.M. 40·5°C. Urine is turbid, viscid, yellow in colour, Sp. Gr. 1,020, alkaline, contains no albumen. Temp. 5 P.M. 40·1°C. P. 52. R. 28.

27th.—The condition of the animal is unchanged with one exception, *viz.* the œdema of the scrotum has increased and is now spreading forward on the under-surface of the abdomen. Temp. A.M. 38·7°C. P. 52. R. 24. The hæmatozoa are numerous in the blood. Temp. 1 P.M. 39·4°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,018, alkaline, contains no albumen. Temp. 5 P.M. 40°C. P. 68. R. 32.

28th.—This morning the animal presents a somewhat brighter appearance, the visible mucous membranes are clearer, the claret-coloured extravasations on the conjunctivæ are losing their colour. The swelling and œdema on the under-surface of the belly has increased in extent and now is visible between the fore-legs. The pulse is frequent— 56, the individual beats are short and abrupt and the tension of the artery has increased. The respirations are quickened, but the lungs are free from disease. The appetite continues good. Temp. A.M. 39°C. R. 32. The hæmatozoon is absent from the blood. Temp. 1 P.M. 39·7°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,014, alkaline, contains neither albumen nor crystals. Temp. 5 P.M. 39·3°C. P. 56. R. 32. This being the first day since the admission of the animal on which the organism has been absent from the blood, the opportunity was taken of commencing the Arsenical treatment. Consequently two doses of four grains each in the form of Liquor Arsenicalis P. B. were given in the drinking water during the twenty-four hours.

29th.—The swelling and œdema on the under-surface of the belly has again increased since yesterday, otherwise the general condition of the animal is unchanged. Temp. A.M. 38·5°C. P. 56. R. 28. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·5°C. Urine, turbid, viscid, pale-yellow in colour, Sp. Gr. 1,010, acid in re-action, but contains no albumen or crystals of Carbonate or Oxalate of Calcium. Eight grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·6°C. P. 56. R. 16.

30th. The general condition of the animal is unchanged. Temp. A.M. 37·6C°. P. 52. R. 16. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·1°C. Urine, turbid, viscid, yellow in colour, Sp. Gr. 1,010, acid, contains no albumen. Nine grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·4°C. P. 60. R. 16.

31st.—The general condition of the animal is unchanged. Temp. A.M. 38°C. P. 60. R. 20. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·1°C. Urine, turbid, pale-yellow in colour, Sp. Gr. 1,010, acid, contains no albumen. Ten grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·8°C. P. 60. R. 16.

1st February.—There is very little change in the condition of the animal. The œdema of the extremities is less and there is a slight diminution in the amount of the same on the under-surface of the abdomen. The pulse continues frequent and the beat is still somewhat sharp and abrupt. The appetite is very good and the evacuations natural in character. Temp. A.M. 37·6°C. P. 60. R. 16. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·8°C. Urine, turbid, pale-yellow in colour, Sp. Gr. 1,012, neutral, contains no albumen. Ten grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·4°C. P. 60. R. 16.

2nd.—The animal presents a somewhat brighter appearance, although it stands still for long periods. The head is held upright. The visible mucous membranes are clear and no fresh petechiæ have invaded the conjunctivæ. The pulse is strong and regular and the abrupt, jerky beat has been replaced by a larger one, but the tension remains high. The appetite is fairly good. Temp. A.M. 37·6°C. P. 56. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38°C. Urine, turbid, yellow in colour, Sp. Gr. 1,010, acid, contains no albumen. Ten grains of Arsenic were given during the twenty-four hours. Temp. 5 P.M. 38·5°C. P. 60. R. 12.

3rd.—The condition of the animal is unchanged. Temp. A.M. 37·4°C. P. 52. R. 12. The hæmatozoon is absent. Temp. 1 P.M. 37·6°C. Urine, turbid, yellow in colour, Sp. Gr. 1,012, acid in re-action, contains no albumen. The treatment is to be discontinued from this date. Temp. 5 P.M. 38·5°C. P. 56. R. 16.

4th.—The condition of the animal is unchanged. Temp. A.M. 37·3°C. P. 52. R. 12. The hæmatozoon is absent from the bood. Temp. 1 P.M. 38°C. Urine, turbid, yellow in colour, Sp. Gr. 1,016, acid in re-action, contains no albumen. Temp. 5 P.M. 39·1°C. P. 60. R. 12.

5th.—The condition of the animal is unchanged. Temp. A.M. 38°C. P. 40. R. 8. The hæmatozoon is absent. Temp. 1 P.M. 38·3°C. Urine, turbid, orange in colour, Sp. Gr. 1,020, alkaline, contains albumen ¼th. Temp. 5 P.M. 39·2°C. P. 56. R. 12.

6th.—Since the Arsenic was discontinued, the animal appears to be losing condition. The visible mucous membranes remain clear, and there is an absence of petechiæ. Temp. A.M. 38·3°C. P. 56. R. 12. The hæmatozoon is absent. Temp. 1 P.M. 38·7°C. No urine passed during the day. Temp. 5 P.M. 39·1°C. P. 68. R. 12.

7th.—The condition of the animal is unchanged. Temp. A.M. 37·8°C. P. 64. R. 12. The hæmatozoon is absent. Temp. 1. P.M. 38·5°C. Urine, passed but none collected. Temp. 5 P.M. 39·4°C. P. 64. R. 12.

8th.—The animal presents a dull appearance. The visible mucous membranes are injected, and there are few small petechiæ on the membranæ nictitantes. The pulse is frequent and the beat somewhat forcible, but regular. Breathing tranquil, respirations 12. The appetite is good and the fæces natural in character. Temp. A.M. 37·6°C. P. 52. The hæmatozoa have returned and are now few in the blood, after an absence of eleven days. Temp. 1 P.M. 37·8°C. Urine, turbid, orange in colour, Sp. Gr. 1,022, acid in re-action, contains no albumen, and no crystals. Temp. 5 P.M. 39·2°C. P. 76. R. 12.

9th.—This morning the animal is weaker. There are numerous and extensive petechiæ invading both conjunctivæ. There is, however, no swelling of the extremities, sheath, or under-surface of the abdomen. The pulse, which last night had increased in frequency, has now fallen to 55, the respirations remain the same as before. The appetite remains good. Temp. A.M. 37·2°C. R. 12. The hæmatozoa are numerous in the blood. Temp. 1 P.M. 38·6°C. Urine, turbid, orange in colour, Sp. Gr. 1,028, acid in re-action, contains no albumen, or crystals; death took place at 5·30 P.M.

AUTOPSY.—The body is well nourished. There is swelling and œdema of the extremities and under-surface of the abdomen extending forward on to the front of the chest.

Thorax.—There is no fluid in the pleural cavities or adhesions of the pleuræ.

Lungs.—Present a few extensive sub-pleural extravasations of blood, and there is localized emphysema of the apices and anterior and inferior borders. On section and pressure fluid containing air exudes from the cut surfaces of both organs.

The *pericardial* cavity contains six ounces of a turbid, amber-coloured fluid.

Heart is enlarged and weighs 6 lbs. ¾ oz. The *external* surface of the organ is free from sub-pericardial petechiæ. *On section*, the right auricle and ventricle contain firm blood clots dark in colour, and the internal linings of the cavities are found to be blood-stained, but there are no extravasations. The left auricle and ventricle are nearly empty; the latter is contracted, and presents a few sub-endocardial extravasations, principally involving the musculi-papillares.

Liver.—Small, weighs 9 lbs. 12½ ozs. There are signs of old perihepatitis. *On section*, the tissues present a healthy appearance.

Spleen—Is enlarged and weighs 2 lbs. 6 ozs. There are numerous sub-capsular petechiæ. *On section*, the tissues are dark in colour, but firm in consistency.

Kidneys.—The right weighs 1 lb. 8 ozs; the left 1 lb. 6½ ozs. *On section* the organs present a healthy appearance.

Stomach is somewhat large. The *cuticular* portion is healthy. The *villous* portion is stained yellow in colour, but the mucous membrane presents a healthy appearance, and there are no *Spiroptera* tumors.

The *Small and Large Intestines* present a healthy appearance.

Bladder.—Mucous membrane healthy.

Remarks.—This animal, a Grey Persian Gelding, aged 8 years, was purchased on 27th November 1889. From that date until 19th January 1893, the records show that it was an inmate of the Infirmary on several occasions for injury, and during two short periods of 5 and 6 days in 1891 and 1892 respectively for Hæmaturia. On 23rd January 1893, at 4 P.M., the temperature rose to 40·5°C., and the hæmatozoon was discovered in the blood on microscopical examination of the blood. On admission to the Laboratory Hospital the animal appeared to be in very good condition, but suffering from fever. Temp. 38°C., P. 44, R. 20, and on examination of the blood the organisms were found to be numerous, large in size and the dorsal membranes distinct and well developed. The following morning, the 26th, well marked symptoms of Surra were present including numerous and extensive conjunctival petechiæ, together with swelling and œdema of the hind limbs and scrotum. The above symptoms were found to have increased in severity on the 27th, but on the 28th the animal presented a brighter appearance and the hæmatozoon was found to be absent from the blood, although the symptoms were as well marked as previously. Consequently it was decided to place the animal on a treatment of Arsenic, and a dose of gr. iv was ordered to be given in water twice daily. In consequence of the virulent form of the disease, marked by its rapidly progressive course, it was decided on the morning of February 3rd, the 12th day of the disease, to discontinue the administration of Arsenic in order that the hæmatozoon might be allowed to re-appear in the blood, so that use might be made of the latter for re-inoculation of the bovine animals. For this purpose it was necessary to obtain virulent material, so that the protective effect or otherwise of the previous inoculations might be noted. On the 8th February, five complete days after omitting the Arsenic, the hæmatozoon re-appeared in the blood and by the following morning had increased to numerous. Death occurred at 5-30 P.M.

RECORDS OF URINE.

Animal, Persian Gelding, No. LXXXIV. Date. January 1893.

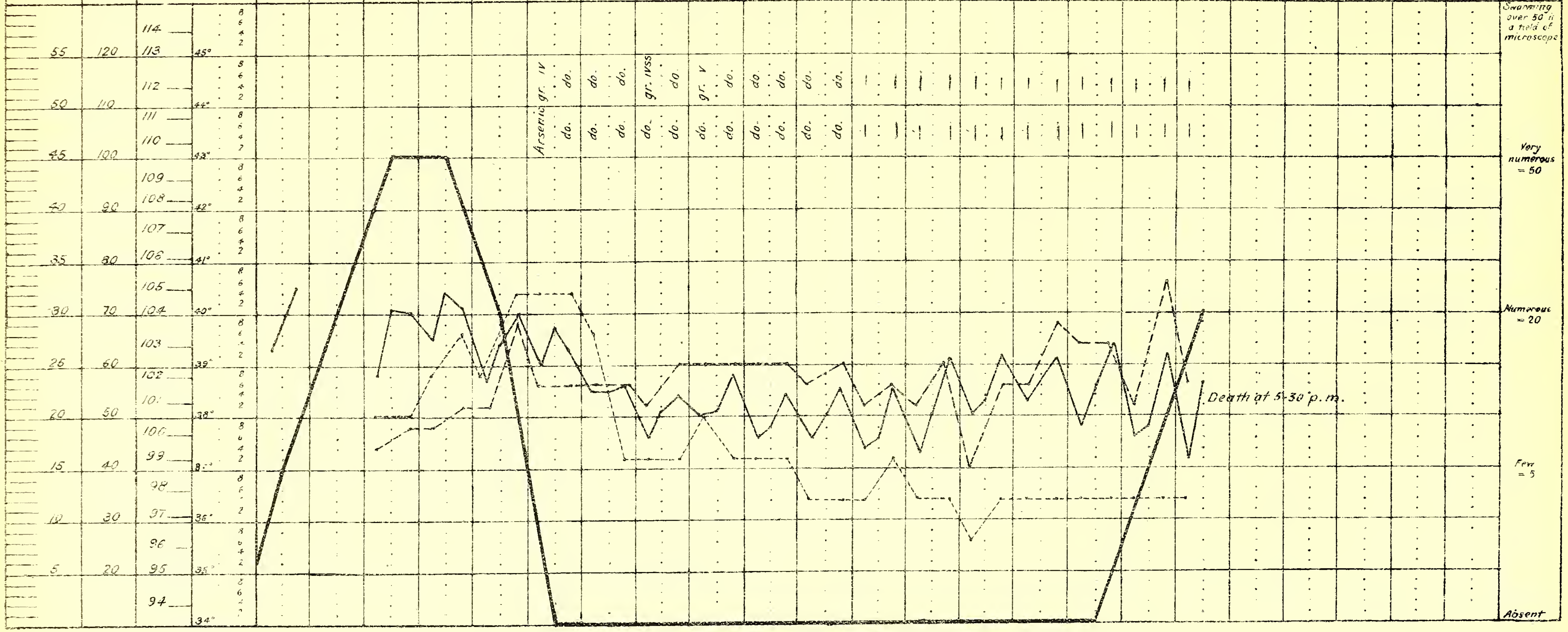
Disease, Surra naturally acquired.

Date.	Quantity.	Colour.	Re-action.	Sp. Gravity.	Albumen.	Phosphates.	REMARKS.
1893.							
January 26	...	Turbid, viscid, yellow...	Alkaline ...	1,020	Nil ...	Nil.	
27	...	Do. orange...	Do. ...	1,018	Nil ...	Nil.	
28	...	Do. yellow ...	Do. ...	1,014	Nil ...	Nil.	
29	...	Turbid, viscid, pale yellow.	Acid ...	1,010	Nil ...	Nil.	
30	...	Do. yellow... ...	Do. ...	1,010	Nil ...	Nil.	
31	...	Turbid, pale yellow ...	Do. ...	1,010	Nil ...	Nil.	
February 1	...	Do. ...	Neutral ...	1,012	Nil ...	Nil.	
2	...	Turbid, yellow	Acid ...	1,010	Nil ...	Nil.	
3	...	Do.	Do. ...	1,012	Nil ...	Nil.	
4	...	Do.	Do. ...	1,016	Nil ...	Nil.	
5	...	Turbid, orange	Alkaline ...	1,020	¼th ...	Nil.	
6	...	No urine passed during the day.					
7	...	Passed, but none collected.					
8	...	Turbid, orange	Acid ...	1,022	Nil ...	Nil.	
9	...	Do.	Acid ... *DEATH.*	1,028	Nil ...	Nil.	

Persian Gelding — Age, 8 — Sex, Gelding — Colour, Grey

Disease, 'Surra' naturally acquired — Date of Attack, 23. 1. 93. — Result, Death — Date of Result, 9. 2. 93 — Register No. LXXXIV

Dates of Observation	Jan/93 23	24	25	26	27	28	29	30	31	Feb. 1	2	3	4	5	6	7	8	9						Record of Organisms in Blood.
Days of Disease	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18						
Organisms in Blood.	F	N	VN	VN	N	—	—	—	—	—	—	—	—	—	—	—	F	N						
Respiration per minute / Pulse per minute / Temperature F C	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	



(3415)

Hæmatozoon curve
Temperature

Drawn & Litho. Govt. Photozinco: Office Poona 1893

Pulse
Respiration

APPENDIX II.

EXPERIMENTAL CASES BY GASTRIC INGESTION OF BLOOD.

HORSES XX, XXVI.

CASE No. XX.—GREY AUSTRALIAN GELDING, *aged 16 years, cast from the R. A., a strong animal and in good health.*

11*th*	*March* 1891.—	Temp. A.M.,	...	P.M.	37·8°C.	Blood healthy.
12*th*	,,	,,	37·5°C.	,,	37·7°C.	,,
13*th*	,,	,,	37·3°C.	,,	37·7°C.	,,
14*th*	,,	,,	37·5°C.	,,	37·6°C.	,,
15*th*	,,	,,	37·6°C.	,,	37·8°C.	,,
16*th*	,,	,,	37·5°C.	,,	37·6°C.	,,
17*th*	,,	,,	37·5°C.	,,	37·6°C.	,,
18*th*	,,	,,	37·6°C.	,,	37·8°C.	,,
19*th*	,,	,,	38·2°C.	,,	38·5°C.	,,
20*th*	,,	,,	38·1°C.	,,	38·4°C.	,,
21*st*	,,	,,	38·1°C.	,,	38·2°C.	,,
22*nd*	,,	,,	38·3°C.	,,	38·5°C.	,,
23*rd*	,,	,,	38°C.	,,	38·4°C.	,,
24*th*	,,	,,	37·8°C.	,,	37·9°C.	,,
25*th*	,,	,,	37·8°C.	,,	37·8°C.	,,
26*th*	,,	,,	37·5°C.	,,	37·7°C.	,,
27*th*	,,	,,	37·7°C·	,,	37·6°C.	,,
28*th*	,,	,,	37·6°C.	,,	37·8°C.	,,
29*th*	,,	,,	37·5°C.	,,	37·7°C.	,,
30*th*	,,	,,	38°C.	,,	38·2°C.	,,
31*st*	,,	,,	38·2°C.	,,	38·5°C.	,,
1*st*	*April* 1891.—	,,	37·5°C.	,,	37·8°C.	,,
2*nd*	,,	,,	37·5°C.	,,	37·7°C.	,,
3*rd*	,,	,,	37·5°C.	,,	37·6°C.	,,
4*th*	,,	,,	37·6°C.	,,	37·8°C.	,,
5*th*	,,	,,	38°C.	,,	38·4°C.	,,
6*th*	,,	,,	38·3°C.	,,	38·5°C.	,,
7*th*	,,	,,	38·2°C.	,,	37·5°C.	,,
8*th*	,,	,,	37·6°C.	,,	38·4°C.	,,
9*th*	,,	,,	38·6°C.	,,	38·5°C.	,,
10*th*	,,	,,	38·2°C.	,,	38·5°C.	,,
11*th*	,,	,,	38·2°C.	,,	38·5°C.	,,
12*th*	,,	,,	38·1°C.	,,	38·4°C.	,,
13*th*	,,	,,	38·3°C.	,,	38·5°C.	,,
14*th*	,,	,,	38·3°C.	,,	38·6°C.	,,
15*th*	,,	,,	38·4°C.	,,	38·7°C.	,,
16*th*	,,	,,	38·2°C.	,,	38·6°C.	,,
17*th*	,,	,,	38·3°C.	,,	38·4°C.	,,
18*th*	,,	,,	38·2°C.	,,	38·4°C.	,,
19*th*	,,	,,	38·1°C.	,,	38·4°C.	,,
20*th*	,,	,,	38·1°C.	,,	38·4°C.	,,
21*st*	,,	,,	38·1°C.	,,	38·4°C.	,,
22*nd*	,,	,,	37·6°C.	,,	37·9°C.	,,
23*rd*	,,	,,	37·9°C.	,,	38·3°C.	,,
24*th*	,,	,,	37·7°C.	,,	37·9°C.	,,
25*th*	,,	,,	38·1°C.	,,	38·3°C.	,,
26*th*	,,	,,	37·9°C.	,,	37·8°C.	,,
27*th*	,,	,,	38·2°C.	,,	38·4°C.	,,
28*th*	,,	,,	38·1°C.	,,	38·3°C.	,,
29*th*	,,	,,	38°C.	,,	38·3°C.	,,
30*th*	,,	,,	38·4°C.	,,	38·6°C.	,,

1*st*	*May* 1891.—	Temp. A.M.	38°C.,	P.M.	38·4°C.	Blood healthy.
2*nd*	,,	,,	38·2°C.	,,	38·6°C.	,,
3*rd*	,,	,,	38·4°C.	,,	38·6°C.	,,

4th May 1891.—At 10 A.M.—Four drops of blood (swarming with Surra hæmatozoa) were taken from Horse No. XIX and placed in one gallon of water and given to the animal two minutes later. Temp. A.M. 38·2°C., P.M. 38·6°C.

5th „ Temp. A.M. 38·4°C., P.M. 38·6°C. No hæmatozoa in the blood.

6th „ „ 38·1°C. „ 38·3°C. „ „

7th „ „ 37·9°C. „ 38·4°C. „ „

8th „ „ 38·2°C. „ 38·5°C. „ „

9th „ At 10 A..M.—Eight minims of blood containing numerous Surra organisms were given in water. Temp. A.M. 38.3°C. No hæmatozoa in the blood. Temp. P.M. 38·5°C.

10th „ Temp. A.M. 38·2°C., P.M. 38·5°C. No hæmatozoa in the blood.

11th „ At 10 A.M.—Six minims of blood containing the Surra hæmatozoa were given in water. Temp. A.M. 38·2°C. No hæmatozoa in the blood. Temp. P.M. 38·5°C.

12th „ There are several small petechiæ present on the conjunctival membranes. Temp. A.M. 38·3°C. No hæmatozoa in the blood. Temp. P.M. 38·5°C.

13th „ Temp. A.M. 38·2°C., P.M. 38·4°C. No hæmatozoa in the blood.

14th „ „ 38·°C. „ 38·2°C. „ „

15th „ „ 37·7°C. „ 38·5°C. „ „

16th „ „ 38·1°C. „ 33·7°C. „ „

17th „ „ 38·4°C. „ 38·3°C. „ „

18th „ At 7-30 A.M.—The animal refused its food and water; temperature elevated but no shivering. Temp. A.M. 38°C., at 10-30 A.M. 394°C., at 11-30, 39·1°C., at 12-30, 38·8°C., at 12-30 P.M. the animal commenced to feed as usual. Blood examined microscopically reveals numerous refractile and mobile bodies. No hæmatozoa in the blood. Temp. P.M. 38·3°C.

19th „ Temp. A.M. 38·°C., P.M. 38·4°C. No hæmatozoa in the blood.

20th „ „ 38·2°C. „ 38·3°C. „ „

21st „ „ 37·9°C. „ 38·2°C. „ „

22nd „ „ 38·9°C. „ 38·4°C. „ „

23rd „ „ 38·1°C. „ 38·3°C. „ „

24th „ „ 38·°C. „ 38·4°C. „ „

25th „ „ 37·8°C. „ 38·3°C. „ „

26th „ There is a soft œdematous tumour on the inside of the groin lying just between the sheath and the skin of the left thigh; it is soft but there is no fluctuation. Temp. A.M. 38·°C. No hæmatozoa in the blood Temp. P.M. 38·4°C.

27th „ The œdematous swelling has increased in size but remains flaccid. Temp. A.M. 38·1°C. No hæmatozoa in the blood. Temp. P.M. 38·5°C.

28th „ Temp. A.M. 37·8°C., P.M. 38·4°C. No hæmatozoa in the blood.

29th „ „ 38·°C. „ 38·3°C. „ „

30th „ „ 38·°C. „ 38·4°C. „ „

31st „ „ 37·9°C· „ 38·5°C. „ „

1st June 1891.— „ 38·3°C. „ 38·2°C. „ „

2nd „ „ 37·7°C. „ 38·5°C. „ „

3rd „ „ 37·8°C. „ 36·5°C. „ „

4th „ „ 38·2°C. „ 38·4°C. „ „

5th „ „ 37·8°C. „ 38·3°C. „ „

6th „ At 10 A.M.—Eight minims (m. viii) of blood containing numerous Surra organisms were given to the animal in water. Temp. A.M. 38°C. No hæmatozoa in the blood. Temp. P.M. 38·4°C.

7th „ Temp. A.M 37·9°C., P.M. 38·6°C. No hæmatozoa in the blood.

8th „ „ 38·4°C· „ 38·5°C. „ „

9th „ „ 38·1°C· „ 38·3°C. „ „

10th „ „ 38·4°C· „ 38·6°C. „ „

11th „ „ 38·5°C· „ 38·7°C. „ „

12th „ „ 38·6°C· „ 38·2°C. „ „

13th „ „ 37·7°C· „ 38·4°C. „ „

14th June 1891. At 11 A.M.—Thirty minims of blood taken from Horse No. XXII and containing numerous hæmatozoa were given to the animal in three quarts of water. Temp. A.M. 38·1°C. No hæmatozoa in the blood. Temp. P.M. 38·6°C.

15th „ Temp. A.M. 38·3°C., P.M. 38·7°C. No hæmatozoa in the blood.

16th „ At 10 A.M.—Ten minims of blood containing swarms of organisms taken from Horse No. XXIII were given in water. Temp. A.M. 38·4°C. No hæmatozoa in the blood. Temp. P.M. 38·6°C.

17th „ At 10 A.M.—Twenty-five minims of blood from which the hæmatozoon was absent were given in water. Temp. A.M. 38·2°C. No hæmatozoa in the blood. Temp. P.M. 38·5°C.

18th „ Temp. A.M. 38·1°C., P.M. 38·4°C. No hæmatozoa in the blood.
19th „ „ 38·2°C. „ 38·5°C. „ „
20th „ „ 38·2°C. „ 38·3°C. „ „
21st „ „ 38·5°C. „ 37·6°C. „ „
22nd „ „ 37·7°C. „ 37·4°C. „ „
23rd „ „ 37·7°C. „ 37·6°C. „ „
24th „ „ 37·7°C. „ 37·6°C. „ „
25th „ „ 37·6°C. „ 37·5°C. „ „
26th „ „ 37·6°C. „ 37·7°C. „ „
27th „ „ 37·4°C. „ 37·8°C. „ „

28th „ At 9·30 A.M.—Two hundred minims of blood taken from Horse No. XXIII containing very numerous hæmatozoa were given in a bucket full of water to the animal. Temp. A.M. 37·4°C. No hæmatozoa in the blood. Temp. P.M. 37·7°C.

29th „ Temp. A.M. 37·1°C., P.M. 37·6°C. No hæmatozoa in the blood.
30th „ „ 37·6°C. „ 37·8°C. „ „

1st July 1891.—Temp. A.M. 37·6°C., P.M. 38·6°C. No hæmatozoa in the blood.
2nd „ „ 37·6°C. „ 38·°C. „ „
3rd „ „ 37·6°C. „ 37·8°C. „ „
4th „ „ 37·5°C. „ 37·6°C. „ „
5th „ „ 37·1°C. „ 37·5°C. „ „
6th „ „ 37·3°C. „ 37·3°C. „ „
7th „ „ 37·3°C. „ 37·3°C. „ „
8th „ „ 37·°C. „ 37·2°C. „ „
9th „ „ 37·1°C. „ 37·3°C. „ „
10th „ „ 37·°C. „ 37·2°C. „ „
11th „ „ 36·6°C. „ 37·8°C. „ „
12th „ „ 38·4°C. „ 37·8°C. „ „
13th „ „ 37·3°C. „ 37·7°C. „ „
14th „ „ 37·5°C. „ 37·4°C. „ „
15th „ „ 37·3°C. „ 37·7°C. „ „
16th „ „ 37·°C. „ 37·8°C. „ „
17th „ „ 37·3°C. „ 37·8°C. „ „
18th „ „ 37·4°C. „ 37·7°C. „ „
19th „ „ 37·2°C. „ 37·7°C. „ „
20th „ „ 37·3°C. „ 37·8°C. „ „
21st „ „ 37·2°C. „ 37·5°C. „ „
22nd „ „ 37·5°C. „ 37·6°C. „ „
23rd „ „ 36·7°C. „ 37·7°C. „ „
24th „ „ 37·1°C. „ 37·3°C. „ „

25th „ A small patch of œdema on the left side of the sheath appeared this morning. Temp. A.M. 36·8°C. No hæmatozoa in the blood. Temp. P.M. 37·6°C.

26th „ Temp. A.M. 37·°C., P.M. 37·7°C. No hæmatozoa in the blood.
27th „ „ 37·1°C. „ 37·6°C. „ „

28th *July* 1891.—Temp.	A.M. 37·°C.	P. M. 37·3°C.	No hæmatozoa in the blood.
29th „ „	36·1°C.	„ 37·6°C.	„ „
30th „ „	36·7°C.	„ 37·5°C.	„ „
31st „ „	37·1°C.	„ 37·6°C.	„ „
1st August 1891.—Temp.	A.M. 37·°C.,	P.M. 37·5°C.	No hæmatozoa in the blood.
2nd „ „	37·°C.	„ 37·4°C.	„ „
3rd „ „	36·8°C.	„ 37·2°C.	„ „
4th „ „	37·°C.	„ 37·3°C.	„ „
5th „ „	37·1°C.	„ 37·2°C.	„ „
6th „ „	37·1°C.	„ 37·3°C.	„ „
7th „ „	36·8°C.	„ 37·4°C.	„ „
8th „ „	37·1°C.	„ 37·3°C.	„ „
9th „ „	36·7°C.	„ 37·2°C.	„ „
10th „ „	36·4°C.	„ 37·4°C.	„ „
11th „ „	36·8°C.	„ 37·1°C.	„ „
12th „ „	36·7°C.	„ 37·1°C.	„ „
13th „ „	36·8°C.	„ 37·2°C.	„ „
14th „ „	36·8°C.	„ 37·4°C.	„ „
15th „ „	37·1°C.	„ 37·3°C.	„ „
16th „ „	37·1°C.	„ 37·3°C.	„ „
17th „ „	36·8°C.	„ 37·5°C.	„ „
18th „ „	37·1°C.	„ 37·3°C.	„ „
19th „ „	36·8°C.	„ 37·4°C.	„ „
20th „ „	37·1°C.	„ 37·2°C.	„ „
21st „ „	36·8°C.	„ 37·3°C.	„ „
22nd „ „	36·8°C.	„ 37·6°C.	„ „
23rd „ „	36·8°C.	„ 37·5°C.	„ „
24th „ „	37·°C.	„ 37·1°C.	„ „
25th „ „	36·4°C.	„ 37·2°C.	„ „
26th „ „	37·°C.	„ 37·3°C.	„ „
27th „ „	37·°C.	„ 37·3°C.	„ „
28th „ „	36·8°C.	„ 37·2°C.	„ „
29th „ „	36·7°C.	„ 37·1°C.	„ „
30th „ „	36·6°C.	„ 37·0°C.	„ „
31st „ „	36·8°C.	„ 37·0°C.	„ „
1st September 1891.—Temp.	A.M. 36·8°C.,	P.M. 37·8°C.	No hæmatozoa in the blood.
2nd „ „	37·°C.	„ 37·8°C.	„ „
3rd „ „	37·1°C.	„ 37·7°C.	„ „
4th „ „	37·2°C.	„ 37·6°C.	„ „
5th „ „	36·8°C.	„ 37·7°C.	„ „
6th „ „	36·7°C.	„ 37·1°C.	„ „
7th „ „	36·6°C.	„ 37·2°C.	„ „
8th „ „	37·°C.	„ 37·3°C.	„ „
9th „ „	36·8°C.	„ 37·2°C.	„ „
10th „ „	37·°C.	„ 37·5°C.	„ „

11th „ The animal presents a dull and feverish appearance this morning, but the appetite is good. There are several petechiæ on the conjunctival membranes, especially well marked upon the m. nictitantes. Temp. A.M. 39·4°C. The hæmatozoon appeared in the blood for the first time this morning and are now numerous. The temperature rose to 40·°C. at 11 A.M., 40·4°C. at noon, and fell to 40·1°C. at 2 P.M.; 5 P.M. 39·4°C.

12th „ In about the same condition as yesterday. Pulse hard and frequent. Temp. A.M. 40·3°C. Hæmatozoa swarming in the blood. Temp. 40·6°C. at noon. At 5 P.M. 39·7°C.

13th „ The animal still appears dull and feverish. The visible mucous membranes are yellow in colour and deeply petechiated, and the pulse is hard and frequent. The sheath is also slightly swollen. Temp. A.M. 39·7°C. The hæmatozoa are swarming in the blood. Temp. 1 P.M. 40·°C., 5 P.M. 39·3°C.

14th September 1891.—The animal is still dull and feverish. The swelling of the sheath has increased in amount and the hind limbs are commencing to swell especially about the fetlocks. Temp. A.M. 40·°C. The hæmatozoa are still swarming in the blood. Temp. 1 P.M. 40·6°C., 5 P.M. 39·5°C.

15th „ The animal is brighter this morning. A blood-stained mucous secretion collects at the inner canthus of both eyes, and on microscopical examination it is found to contain the hæmatozoon. Temp. A.M. 39·3°C. Hæmatozoa swarming in the blood. Temp. 1 P.M. 40·3°C., 5 P.M. 40·5°C.

16th „ The condition of the animal is unchanged. There are numerous large extravasations on the conjunctival membranes. The pulse is strong and regular, the beats being normal in number. The œdema of the limbs and sheath has somewhat increased in amount. Temp. A.M. 38·3°C. The hæmatozoon is absent from the blood. Temp. P.M. 39·6°C.

17th „ The animal is decidedly brighter and better than yesterday. The discharge from the eyes continues, but the petechiæ are fading on the conjunctivæ. The pulse is strong, regular and normal as regards frequency. The œdema continues to slowly increase in amount. The appetite is good but the intestines are somewhat distended with flatus. The excretions are normal in character. Temp. A.M. 38·2°C. The hæmatozoon is absent from the blood. Temp. P.M. 38·4°C.

18th „ The condition of the animal is the same as yesterday. Temp. A.M. 39·5°C. The hæmatozoon is absent from the blood. Temp. P.M. 38·3°C.

19th „ The animal appears somewhat weak and is falling off in condition. An eruption of Urticaria appeared early this morning over the fore quarters, shoulders, neck, and the hind quarters. The œdema of the sheath and hind limbs has increased in amount during the last four days, the limbs appearing full and almost round. Temp. A.M. 38·2°C. There are a few hæmatozoa in the blood. Temp. 1 P.M. 38·7°C. and 5 P.M. 38·4°C.

20th „ The general condition of the animal is unchanged. Temp. A.M. 39·1°C. The hæmatozoa are swarming in the blood. Temp. 1 P.M. 39·6°C., 5 P.M. 38·6°C.

21st „ The animal is dull this morning. The pulse is peculiarly hard and frequent. The œdema is extending on the under-surface of the abdomen. Temp. A.M. 39·4°C. The hæmatozoa are swarming in the blood. Temp. 1 P.M. 41·°C., 5 P.M. 41·°C.

22nd „ The animal is better this morning and is feeding well, but the pulse still remains hard and frequent, and the temperature has fallen to normal. The dung presents a glairy appearance, due to its being coated with a layer of mucus. Temp. A.M. 37·7°C. The hæmatozoa are numerous in the blood. Temp. 1 P.M. 38·7°C., 5 P.M. 38·6°C.

23rd „ The animal is decidedly weaker, moving about unwillingly and is also rapidly falling off in condition. It is however bright and is feeding well. Temp. A.M. 36·6°C. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·1°C., 5 P.M. 37·6°C.

24th „ The animal is in the same condition as yesterday. The œdema is slowly extending under the abdomen and between the fore-legs, and the hind legs continue to be swollen and œdematous. Temp. A.M. 37·7°C. There are a few hæmatozoa in the blood. Temp 1 P.M. 37·8°C., 5 P.M. 38·1°C.

25th „ The condition of the animal is unchanged, but the pulse is hard and full in character. The conjunctival membranes are still deeply petechiated. Temp. A.M. 37·8°C. The hæmatozoa are numerous in the blood. Temp. 1 P.M. 38·2°C. Urine, turbid, yellow in colour, presenting a white sediment on standing and is strongly alkaline. Sp. Gr. 1,012. It contains large quantities of Carbonate and Oxalate crystals in large and small striated spheres, also irregularly angular, octahedral, rhomboidal and triangular-shaped colourless ones. Temp. 5 P.M. 38·1°C.

26th September 1891.—The animal appears dull this morning. The pulse is hard and frequent. The temperature is considerably elevated, 40·4°C. The patient is getting weaker and presents a staggering gait due to weakness in the hind quarters when made to move. The œdema is now considerable in amount and the animal is in very weak condition, but the appetite remains very good. The hæmatozoa are very numerous in the blood. Temp. 1 P.M. 41·0°C. Urine, turbid, orange in colour. Sp. Gr. 1,014, strongly alkaline, a trace of albumen. Temp. 5 P.M. 39·1°C.

27th ,, The animal is very dull this morning; pulse still hard and irritable. There is slight jugular regurgitation and the heart-beats are tumultuous. The œdema is still increasing and the weakness is very pronounced. Temp. A.M. 40·4°C. Hæmatozoa are very numerous in the blood. Temp. 1 P.M. 40·1°C. Urine, turbid, orange in colour. Sp. Gr. 1,020, strongly alkaline, same as yesterday. Temp. 5 P.M. 40·3°C.

28th ,, This morning the animal appears much brighter. The appetite is good, but the animal is still very weak. Temp. A.M. 38·5°C. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·7°C. Urine, turbid, a rich orange in colour. Sp. Gr. 1,031, strongly alkaline, no albumen. Temp. 5 P.M. 37·8°C.

29th ,, The general condition of the animal is unchanged. The œdema has, however, increased in amount and the petechiæ are still well marked on the conjunctivæ. The pulse is stronger and has improved in character. Temp. A.M. 37·6°C. Hæmatozoa absent from the blood. Temp. 1 P.M. 37·8°C. Urine, turbid, yellow in colour, with a considerable amount of sediment. Sp. Gr. 1,006, strongly alkaline, numerous crystals of Carbonate of Calcium, but albumen a trace. Temp. 5 P.M. 37·2°C.

30th ,, The condition of the animal is unchanged and it is progressively losing flesh; the pulse is fairly strong and regular. The appetite is good. Temp. A.M. 37·3°C. There are no hæmatozoa in the blood. Temp. 1 P.M. 37·8°C. Urine, turbid, greenish-yellow in colour. Sp. Gr. 1,012, strongly alkaline, albumen a trace. Numerous Carbonate of Calcium crystals. Temp. 5 P.M. 38·1°C.

1st October 1891.—The condition of the animal is unchanged. Temp. A.M. 37·4°C. There are a few hæmatozoa in the blood. Temp. 1 P.M. 39·1°C. Urine, turbid, greenish-yellow in colour. Sp. Gr. 1,009, strongly alkaline, albumen a trace, numerous crystals of Calcium Carbonate. Temp. 5 P.M. 38·0°C.

2nd ,, The animal is dull this morning and certainly weaker; the pulse hard and frequent. The ecchymoses are still well marked on the conjunctivæ. The œdema has increased in amount. Temp. A.M. 39·8°C. The hæmatozoa are numerous in the blood. Temp. 1 P.M. 39·8°C. Urine, turbid, orange in colour. Sp. Gr. 1,020, strongly alkaline, albumen a trace. Temp. 5 P.M. 39·4°C.

3rd ,, The animal still appears dull. The pulse is very hard and irritable and the heart's action tumultuous. Temp. A.M. 39·4°C. The hæmatozoa are very numerous in the blood. Temp. 1 P.M. 41·0°C. Urine, turbid, orange in colour. Sp. Gr. 1,032, albumen a trace. Temp. 5 P.M. 39·0°C.

4th ,, The general condition of the animal continues unchanged. Temp. A.M. 41·1°C. The hæmatozoa are very numerous in the blood. Temp. 1 P.M. 37·4°C. Urine is turbid, orange in colour. Sp. Gr. 1,016, strongly alkaline, albumen a trace. Temp. 5 P.M. 37·6°C.

5th ,, Condition unchanged. Temp. A.M. 37·7°C. The hæmatozoa are numerous in the blood. Temp. 1 P.M. 40·0°C. Urine, turbid, orange in colour. Sp. Gr. 1,015, strongly alkaline, no albumen. Temp. 5 P.M. 39·0°C.

6th ,, The animal looks brighter this morning but is weak and emaciated; it continues to feed well. The œdema of the limbs and abdomen has increased considerably. Temp. A.M. 37·8°C. Hæmatozoa few in the blood. Temp. 1 P.M. 38·1°C. Urine, orange in colour. Sp. Gr. 1,012, strongly alkaline, albumen a trace. Temp. 5 P.M. 38·2°C.

7th October 1891.—The general condition of the animal is unchanged. The petechiæ on the conjunctivæ are fading. The appetite remains remarkably good. Temp. A.M. 38·4°C. Hæmatozoa absent from the blood. Temp. 1 P.M. 38·4°C. Urine, turbid, orange in colour. Sp. Gr. 1,016, strongly alkaline. Temp. 5 P.M. 38·6°C.

8th „ The animal is again dull and semi-somnolent. The pulse is frequent but strong and regular. The petechiæ have almost disappeared from the conjunctival membranes. Temp. A.M. 38·8°C. P. 64. R. 26. The hæmatozoa are very numerous in the blood. Temp. 1 P.M. 39·6°C. Urine, turbid, orange in colour. Sp. Gr. 1,030, alkaline, albumen. Carbonates and Oxalates of Calcium crystals. Temp. 5 P.M. 39·2°C.

9th „ The animal continues dull. The pulse is very hard and irritable and the heart's beats tumultuous, together with jugular regurgitation. The conjunctival membranes are again covered with petechiæ. Temp. A.M. 40·1°C. The hæmatozoa are swarming in the blood. Temp. 1 P.M. 40·1°C. Urine, turbid, orange in colour. Sp. Gr. 1,020, strongly alkaline, albumen. Temp. 5 P.M. 39·4°C.

10*th* „ The animal continues in the same condition as yesterday, but is weaker. The progressive emaciation is more marked; the pulse continues to be very hard and irritable; the impulse of the heart-beats visibly shakes the animal; appetite fair. Temp. A.M. 38·5°C. The hæmatozoa are swarming in the blood. Temp. 1 P.M. 40·1°C. Urine, turbid, of a brownish pea-soup colour. Sp. Gr. 1,022, strongly alkaline, albumen, large numbers of Carbonate crystals. Temp. 5 P.M. 40·°C.

11*th* „ The condition of the animal is unchanged. Temp. A.M. 38·1°C. The hæmatozoa are swarming in the blood. Temp. 1 P.M. 38·4°C. Urine, viscid, turbid, greenish-brown in colour. Sp. Gr. 1,026, strongly alkaline, albumen small quantity. Temp. 5 P.M. 39·4°C.

12*th* „ The animal is weaker, the œdema more extensive, the hind quarters roll from side to side and the animal staggers when caused to move. The heart-beats remain as before tumultuous. The animal, strange to say, still feeds fairly well. Temp. A.M. 38·8°C. The hæmatozoa are few in the blood. Temp. 1 P.M. 40·6°. Urine, viscid, turbid, greenish-brown in colour. Sp. Gr. 1,026, alkaline, contains a small quantity of albumen. Temp. 5 P.M. 39·5°C.

13*th* „ The general condition of the animal is unchanged. Temp. A.M. 38·8°C. The hæmatozoa are few in the blood. Temp. 1 P.M. 40·0°C. Urine, turbid, viscid, greenish-brown in colour. Sp. Gr. 1,026, alkaline, albumen a small quantity. Temp. 5 P.M. 38·7°C.

14*th* „ Condition unchanged. Temp. A.M. 38·4°C. The hæmatozoa are few in the blood. Temp. 1 P.M. 39·4°C. Urine, viscid, turbid, greenish-brown in colour. Sp. Gr. 1,025, alkaline, albumen. Temp. 5. P.M. 38·8°C.

15*th* „ There is no change to note this morning, as the animal is as bad as it can possibly be. The pulse is hard and frequent and the beats tumultuous. There is evident loss of power in the hind limbs, together with some paralysis of the lower bowel; the sphincter-ani is relaxed and the anus patent. The hind limbs continue to be much swollen and œdematous. Respirations 48. Pulse 69, but intermittent. The ecchymoses on the conjunctivæ are pale in colour and fading. Temp. A.M. 39·7°C. Hæmatozoa swarming in the blood. Temp. 1 P.M. 39·6°C. Urine, clear, orange-coloured. Sp. Gr. 1,025, alkaline, and contains some albumen. Temp. 5 P.M. 40·1°C.

16*th* „ The general condition of the animal continues unchanged, but at times it has difficulty in keeping itself in the upright position. Temp. A.M. 39·5° C., P. 69. The hæmatozoa are swarming in the blood. Urine, clear, orange in colour, Sp. Gr. 1,010, acid in re-action and contains albumen. Temp. P.M. 40°C.

17*th* „ The animal is much weaker and has been placed in slings for support. The heart's action continues as violent as previously; it appears to shake the animal at each pulsation. Temp. A.M. 38·6°C. The hæmatozoa are swarming in the blood. Temp. 1 P.M. 39·3°C. Urine, clear, orange in colour, Sp. Gr. 1,020, acid and contains albumen.

18th October 1891.—The condition of the animal is unchanged, a fresh crop of ecchymoses has appeared on the conjunctivæ. Muscular tremors of the head, neck and fore-limb are now present. The heart's action continues tumultuous and the pulse is hard, frequent and intermittent. Temp. A.M. 38·1°C. The hæmatozoa are swarming in the blood. Temp. 1 P.M. 39·3°C. Urine is turbid, orange in colour. Sp. Gr. 1,013, acid and contains albumen. Temp. 5 P.M. 39·2°C.

19th „ Strange to say, the animal appears a little stronger and brighter this morning and continues to feed. Temp. A. M. 37·6°C. Hæmatozoa numerous in the blood. Temp. 1 P.M. 38·7°C. Urine, clear, orange in colour, Sp. Gr. 1,014, acid and contains albumen. Temp. 5 P.M. 39°C.

20th „ To-day the animal is again very dull and weak. Fresh crops of ecchymoses have appeared on both conjunctivæ. The appetite is very poor and there is diarrhœa, five evacuations since 6 A.M. up to 11 A.M. Temp. A.M. 38·6°C. Hæmatozoa few in the blood. Temp. 1 P.M. 39·1°C. Urine is clear, orange in colour, Sp. Gr. 1,016. There is no albumen. Temp. 5 P.M. 39°C.

21st „ The diarrhœa continues and the animal is evidently dying; it has, however, eaten its corn ration this morning but refuses grass and hay. Temp. A.M. 37·7°C. The hæmatozoa are numerous in the blood. Temp. 1 P.M. 39·4°C. Urine is clear, yellow in colour, Sp. Gr. 1,012, acid and contains albumen. The animal fell at 4-53 P.M. Temp. 40°C., P. 103., R. 24, and is unable to rise; at 5-5 P.M. the right fore-leg was shot straight out and remained rigid and extended, together with muscular tremors of the head and neck. The heart's action is violent and tumultuous. The pupils are somewhat contracted. Temp. 5-10 P.M. 40·3°C. There has been no struggling up to the present. Temp. 5-25 P.M. 40·3°C. P. 100. R. 26. As the animal commenced to struggle violently, it was destroyed by the administration of Chloroform at 5-45 P.M.

AUTOPSY.—6 P.M., 21st October 1891:

Body much emaciated; hind limbs swollen and œdematous.

On opening the thorax, no fluid was found in the pleural cavities or any signs of adhesions.

Lungs.—The lungs present a pinkish-red colour, without any signs of extravasations on their surfaces. There is a slight amount of emphysema at the apices of the organs and several hard nodules are to be felt lying in the tissue of the organ. *On section* these are found to be calcareous nodules, easily enucleable.

Heart weighs 6 lbs. The cavity of the pericardium contains about two ounces of an amber-coloured fluid, perfectly clear in character. There is one extravasation, about the size of a four-anna piece, lying under the visceral pericardium, covering the right ventricle, and in proximity with the inter-ventricular groove. The endocardial linings of the right and left auricles are free from extravasations. But several small ones ⅛th of an inch in diameter and circular in form, are observed lying under the endocardial lining of the ventricles. The valves, however, present a healthy appearance.

Liver weighs 12 lbs. 5 ozs. and presents several white patches of thickened capsule on its anterior surface, the result of old inflammatory changes. *On section* the organ presents what appears to be a perfectly healthy structure.

Spleen weighs 2 lbs. 1 oz., normal in size, firm and dotted over with a few extravasations of blood.

Kidneys.—Right 1 lb. 7 ozs.; left 1 lb. 7½ ozs. The capsules strip easily and appear somewhat pale, but there are no petechiæ.

Stomach.—Distended with semi-digested food. *On section* the *cuticular* portion of the organ is contracted and wrinkled, presenting a perfectly healthy white appearance. The *villous* portion is also contracted and the mucous membrane thereof thrown into rugæ. There is no sign of congestion or ulceration, and there is a complete absence of parasites.

Small Intestines.—The whole length of the small intestines from the pylorus to the cæcum presents on its mucous surface a glairy viscid green coloured material like white of egg and is tinged green from the lucerne grass. There are also three small red patches, each about the size of a two-anna piece, lying some feet apart but not corresponding with solitary glands or Peyer's patches and presenting no signs of ulceration. There are no parasites.

Large Intestine and Rectum present a healthy appearance. No parasites.

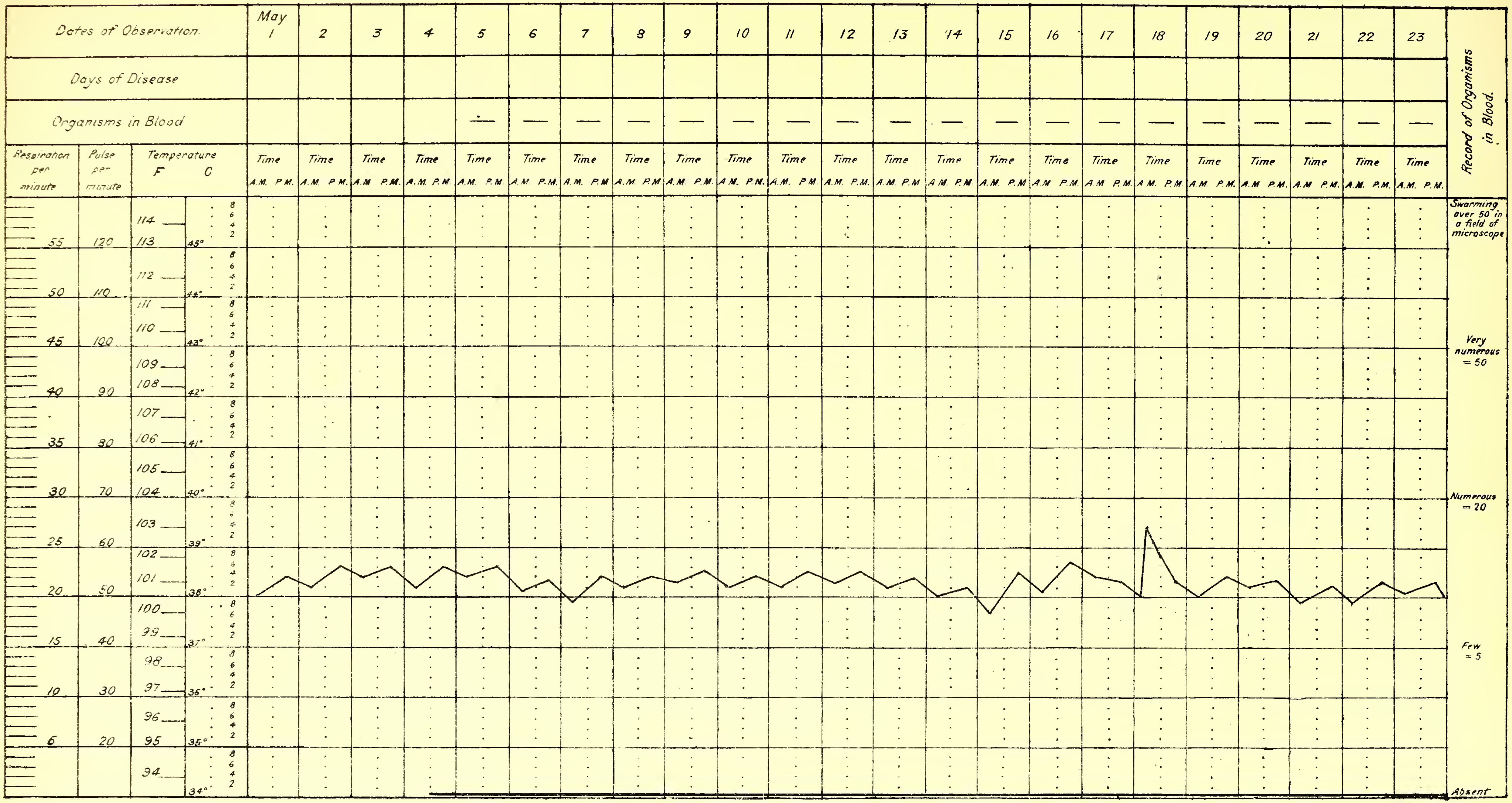
Remarks.—This was a Grey Australian Gelding, which had been cast from the Royal Artillery, 16 years old and in good condition. He was kept under observation from March 11th, 1891, until May 4th, and during this period appeared perfectly healthy. It was then decided to endeavour to produce the disease in a somewhat similar manner to that in which it is naturally contracted. With this end in view, small quantities of blood mixed with a large bulk of water were to be given at short intervals. Accordingly on the 4th May, four drops of blood swarming with the Surra hæmatozoa, mixed with one gallon of fresh water, were given to the animal to drink. Up to the 9th no change at all had taken place in the animal's condition; and on this date, eight drops of blood containing numerous hæmatozoa were given in the same way. On the 10th and 11th, the animal showed no change. On the 11th six drops of blood containing Surra hæmatozoa were given in a quart of water. On the 12th, a few small petechiæ were noticed on the membranæ nictitantes. Up to the 24th, with the exception of a slight indisposition on the 18th, which rapidly passed off, no symptoms of disease were noticed. On the 24th, he received eight drops of blood containing very numerous hæmatozoa, in two quarts of water; but no changes of any importance were noticed up to the 6th June; and on this date, the animal received eight drops of blood, containing numerous hæmatozoa, in water. No change was observed till the 14th June, when thirty minims of blood containing very numerous hæmatozoa, were administered in three quarts of water. On the 16th no change having taken place, ten drops of blood swarming with hæmatozoa were given in water. On the 17th June, twenty-five drops containing no hæmatozoa, but taken from Horse No. XXIII suffering from Surra were given in a gallon of water. From this date up to the 28th June, no change was noticed. On the latter date two hundred minims of blood containing very numerous hæmatozoa, were given in a bucket of water. From this date (June 28th) up to the 1st September, absolutely no symptom of disease was noticed; but from this date until the 6th September, there was a very slight disturbance of temperature, which, however, remained normal. On the 11th September the temperature had risen to 39·4° C. in the morning, and numerous Surra hæmatozoa were observed in the blood; the temperature at noon had risen to 40·4°C. and ranged for the next few days between 38·3° C. and 41° C., during which period the hæmatozoa were swarming in the blood. For the next three days, the 16th, 17th, 18th, the temperature varied between 38·3° C. and 39·6° C., and during this period the hæmatozoa were absent. On the 19th, the temperature was normal, but a slight eruption appeared on the skin of the fore and hind quarters, and the hind limbs became swollen and œdematous; a few hæmatozoa were during this time found in the blood. On the 20th September, although the temperature was only very slightly above normal, the hæmatozoa were found to be very numerous in the blood. On the 21st, the temperature became elevated at mid-day and in the evening reached 41°C. and the hæmatozoa were swarming in the blood. On the 22nd, the temperature had fallen to 37·7°C. that is 3·30°C., and the hæmatozoa were numerous. On the 23rd the temperature had fallen to normal, and the hæmatozoa were absent. On the 24th the temperature still remained normal, but a few hæmatozoa were found in the blood. On the 25th, the temperature was still normal, but the hæmatozoa were numerous in the blood. On the 26th, the temperature had risen to 40·4°C. in the morning and to 41°C. at 1 P.M., the hæmatozoa being very numerous in the blood. The temperature fell from 41°C. to 39·1°C. in the evening but rose again on the 27th to 40·4°C. and reached 42·1°C. at mid-day, the hæmatozoa being very numerous in the blood. On the 28th, the temperature had fallen from 42·1°C. to 38·5°C. and the hæmatozoa were absent from the blood; and this condition continued for the next two days. On October 1st, the temperature remained within normal limits, and a few hæmatozoa were found in the blood. On the 2nd the temperature rose to 39·8°C. and the hæmatozoa were numerous in the blood. On the 3rd, the temperature at midday reached 41° C., but had fallen to 39° C. in the evening, but the hæmatozoa were very numerous in the blood. The morning temperature on the 4th was 41·1°C. but there was a very considerable fall to 37·4°C. in the evening, the hæmatozoa remaining very numerous. On the 5th, the morning temperature was normal, but it rose to 40°C. at midday and the hæmatozoa were numerous in the blood. On the morning of the 6th and during the day, the temperature was normal and the hæmatozoa few in the blood. On the 7th the temperature was normal and the hæmatozoa absent. On the 8th, the highest temperature was 39·6°C., but the hæmatozoa were very numerous in the blood. For the three days, *viz.*, 9th, 10th and 11th October, the temperature oscillated between 38·1°C. and 40·1°C., and the hæmatozoa remained swarming in the blood. On the 12th, 13th and 14th the temperature oscillated between 38·4°C. and 40·6°C., and during this time, the hæmatozoa were few in the blood. From the 15th to the 18th, the hæmatozoa swarmed in the blood, and the highest temperature was 40·1°C.; this, during the next few days, gradually declined and reached 37·6°C. on the 19th, on which day the hæmatozoa were numerous. On the 20th, the hæmatozoa were few in the blood and the highest temperature 39·1°C. On the following day (21st October), the hæmatozoa were numerous and the temperature rose to 40°C. and later, before death took place, to 40·3°C.

The points of interest in this case are as follows:—

(i). That the disease was conveyed to an animal by mixing small quantities of blood containing hæmatozoa, in a relatively enormous bulk of water.

(ii). The very long period of time which elapsed between the *last* exhibition of blood containing the hæmatozoon, and the appearance of it in the blood, *viz.*, 75 days. This is another instance showing the absolute necessity which exists for observations on inoculated animals being continued for a very considerable time, before pronouncing on the efficacy or otherwise of the experiments. It is also of extreme importance clinically showing as it does the difficulty which exists in fixing the time

Disease, Surra by gastric ingestion ________ Date of Inoc. { Between 4-5-91 / 28-6-91 ________ Result, Death ________ Date of Result, 21-10-91 ___ Register No. XX ________



(S 451)

Blood viiii Hæmatozoa Swarming

Drawn & Litho: Govt Photozinco: Office, Poona 1892.

Blood viii Hæmatozoa Few

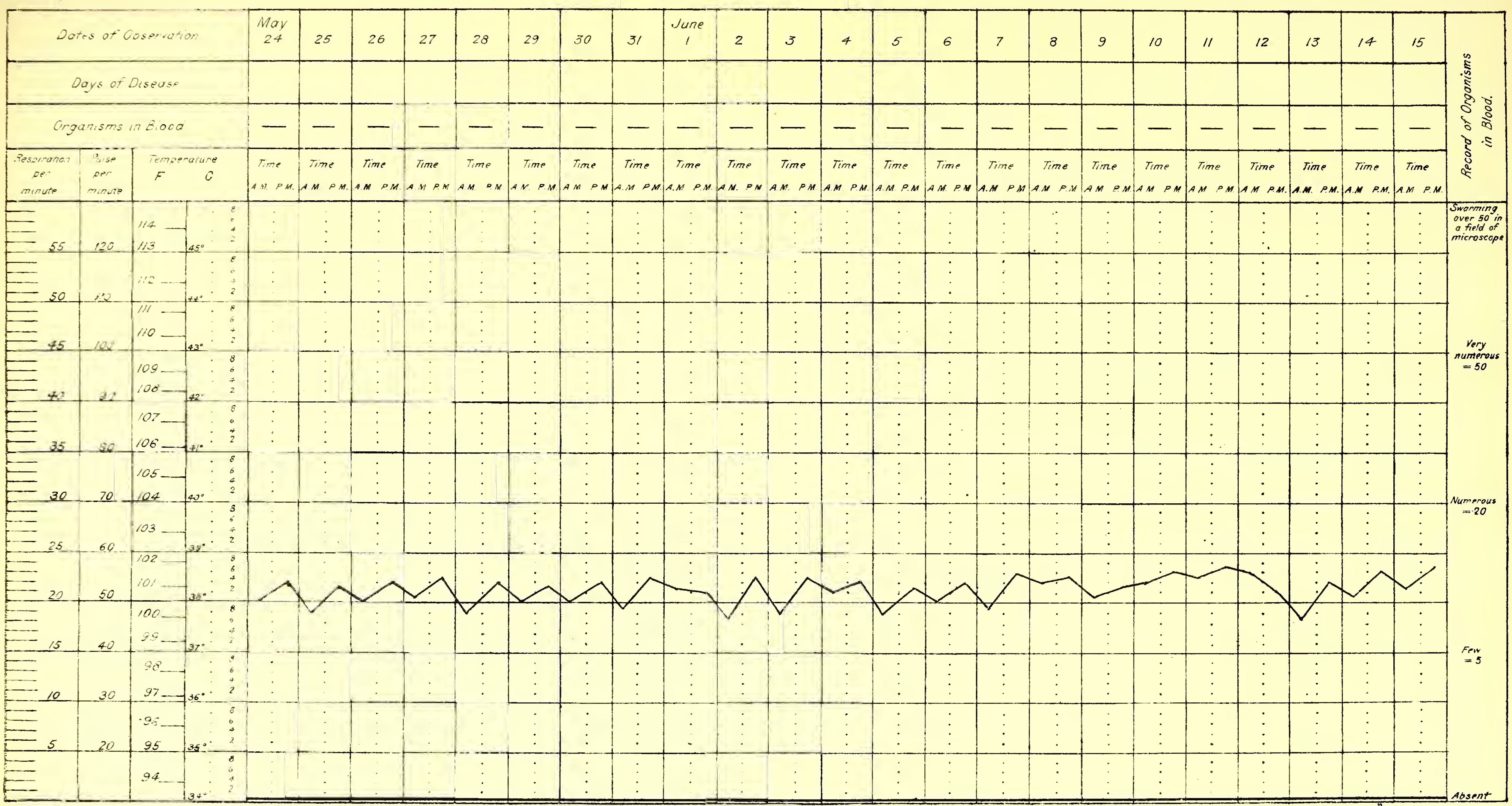
Blood vi Hæmatozoa Few

Hæmatozoon curve ————

Temperature .... ————

Date of Attack   Result   Date of Result   Register No.   XX

Disease ______ Date of Attack ______ Result ______ Date of Result ______ Register No. XX ______



(S. 45)

Hæmatozoon curve
Temperature ....

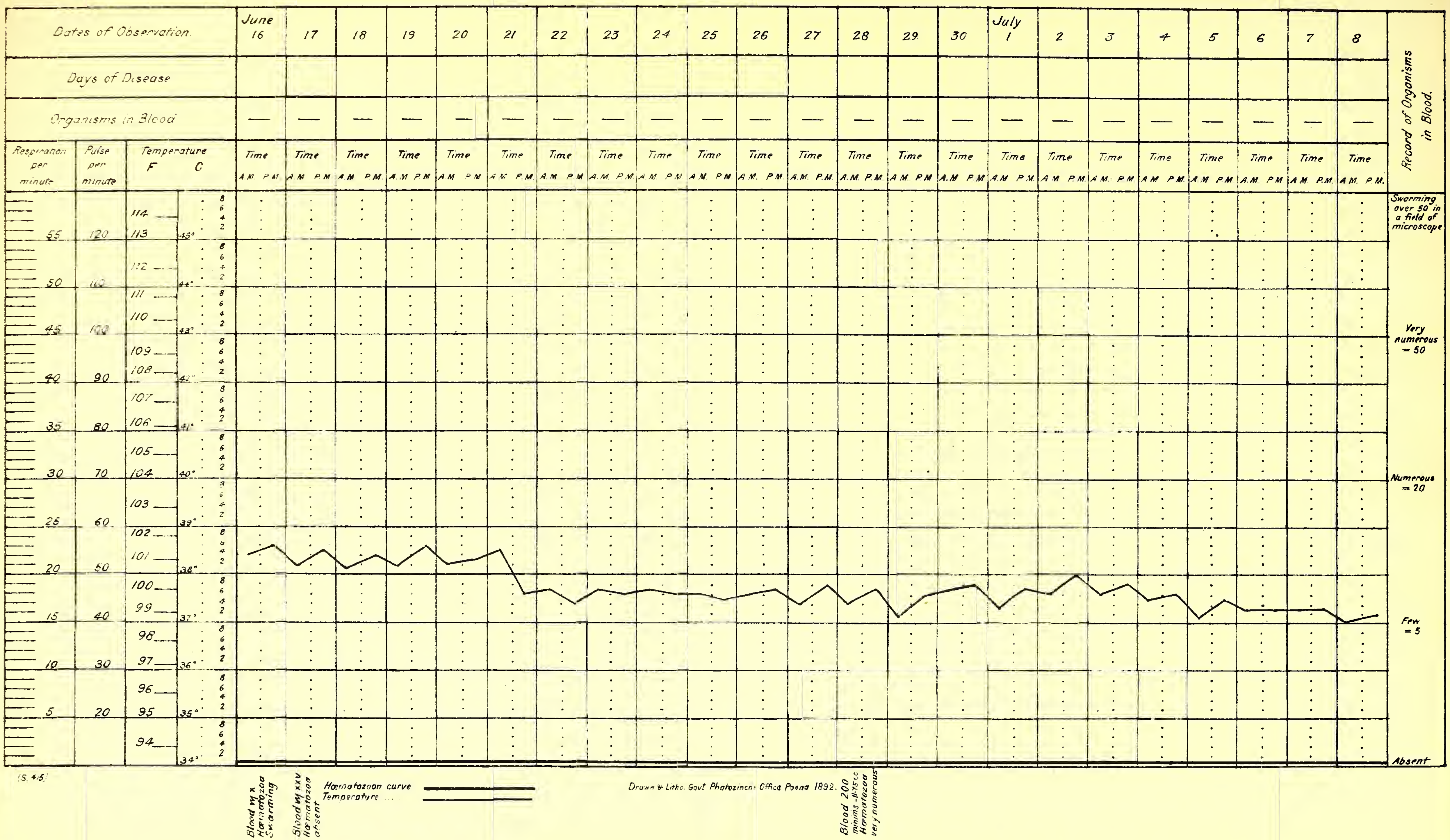
Drawn & Litho: Govt. Photozinco: Office Poona 1892.

Blood m viii

Blood m xxx
Hæmatozoa
Very numerous

Disease ______ Date of Attack ______ Result ______ Date of Result ______ Register No. XX

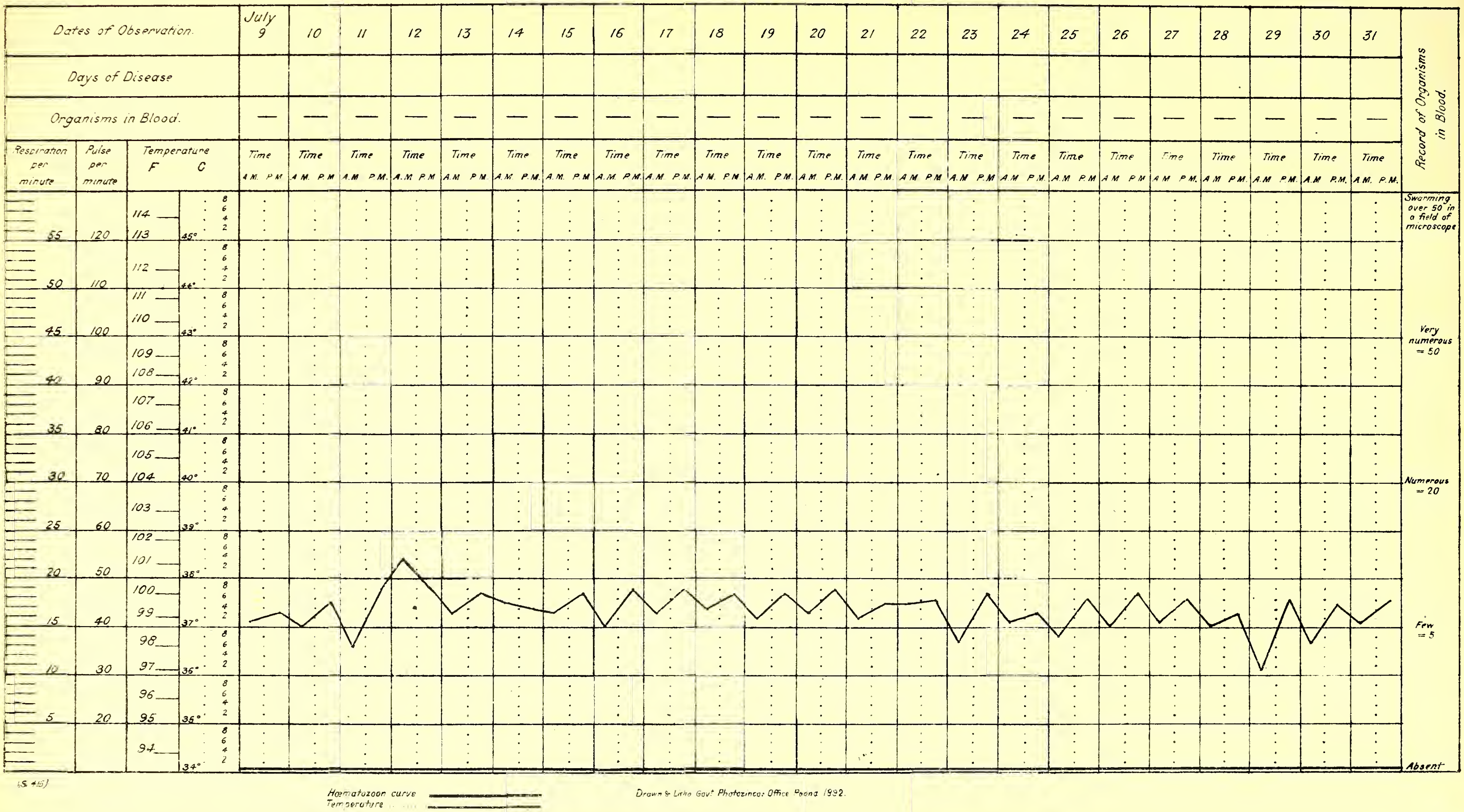
Disease ______ Date of Attack ______ Result ______ Date of Result ______ Register No. XX ______



Drawn & Litho. Govt. Photozinco: Office Poona 1892.

Age ______ Sex ______ Colour ______

Disease ______ Date of Attack ______ Result ______ Date of Result ______ Register No. XX ______



(S 45)

Drawn & Litho Govt. Photozinco: Office Poona 1892.

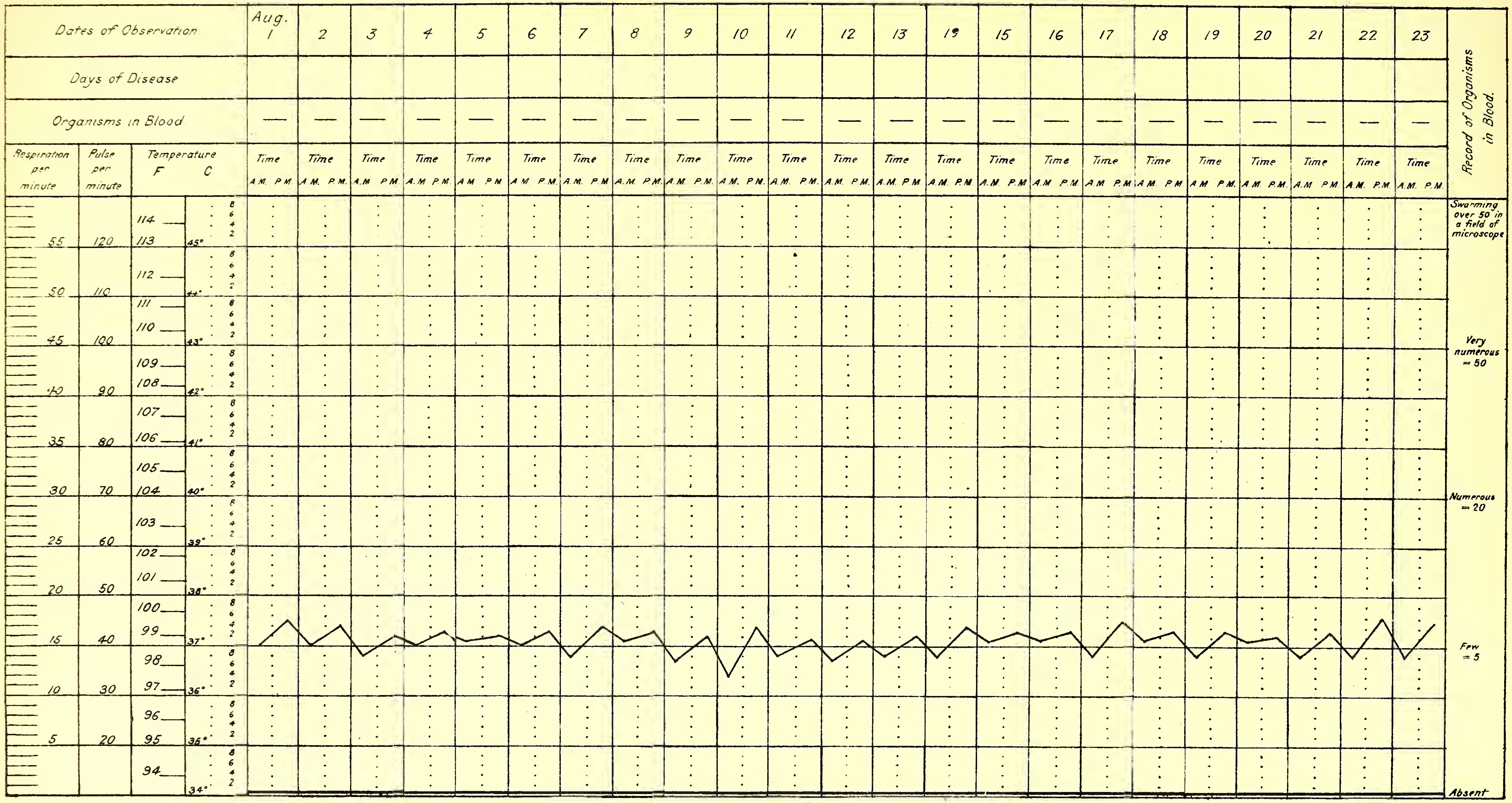
RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age Sex Colour

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age ______ Sex ______ Colour ______

Disease ______ Date of Attack ______ Result ______ Date of Result ______ Register No. XX ______



(S 415)

Hæmatozoon curve
Temperature ....

Drawn & Litho: Govt. Photozinco: Office Poona 1892.

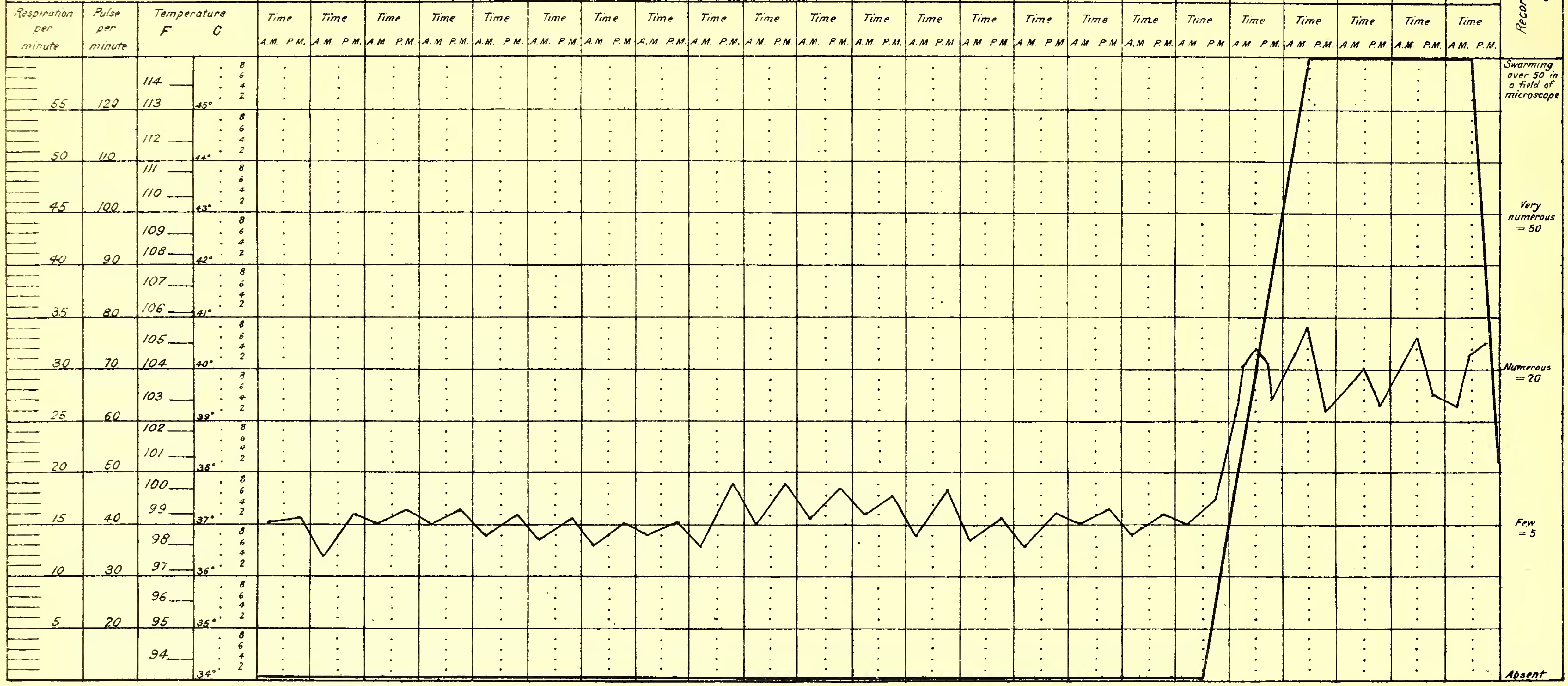
RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age ______ Sex ______ Colour ______

Disease ______ Date of Attack ______ Result ______ Date of Result ______ Register No. XX ______

Dates of Observation.	Aug. 24	25	26	27	28	29	30	31	Sep. 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Days of Disease																			1	2	3	4	5
Organisms in Blood.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	N	S	S	S	S



(S. 415)

Hæmatozoon curve ———

Temperature ......

Drawn & Litho: Govt. Photozinco: Office Poona 1892.

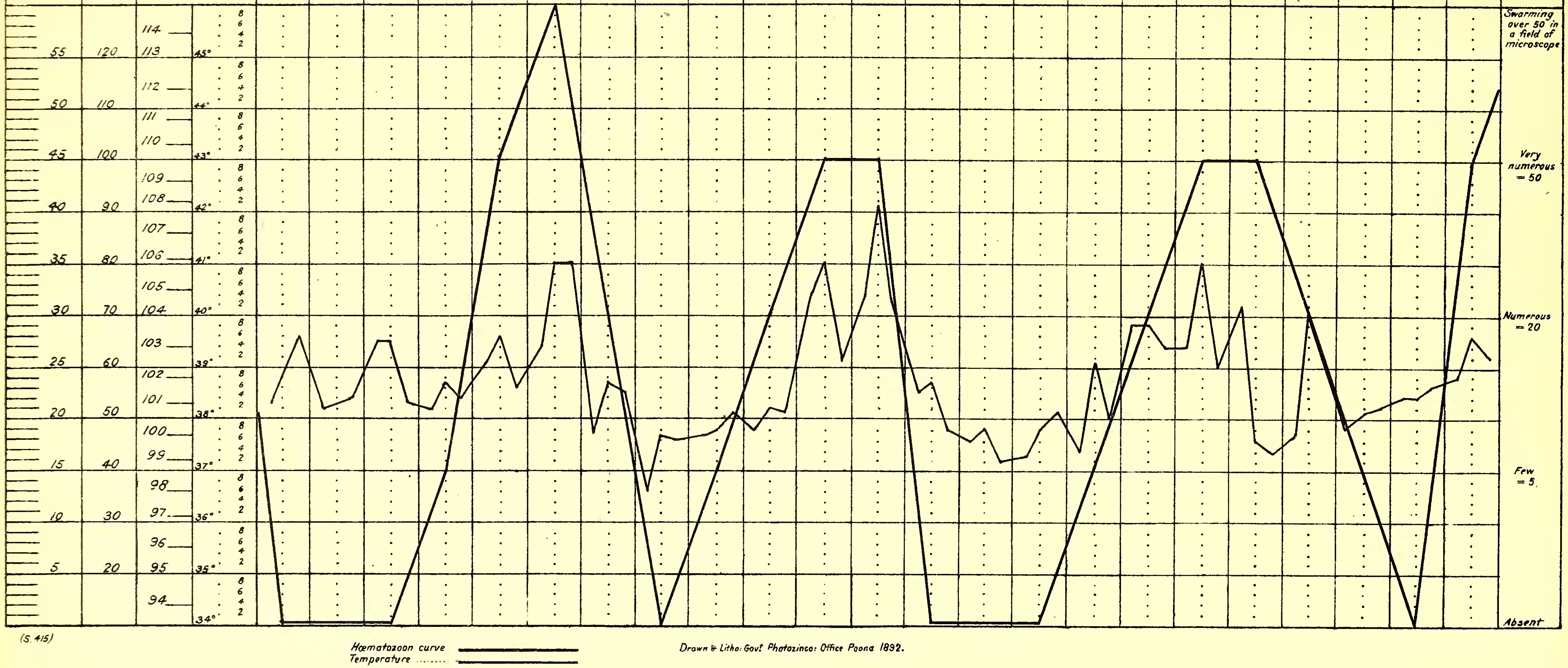
Age ______ Sex ______ Colour ______

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION

Age ______ Sex ______ Colour ______

Disease ______ Date of Attack ______ Result ______ Date of Result ______ Register No. XX ______

Dates o Observation.	Sep. 16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Oct. 31	2	3	4	5	6	7	8	Record of Organisms in Blood.
Days of Disease	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	
Organisms in Blood.	—	—	—	F	VN	S	N	—	F	N	VN	VN	—	—	—	F	N	VN	VN	N	F	—	VN	
Respiration per minute / Pulse per minute / Temperature F C	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	



(S. 415)

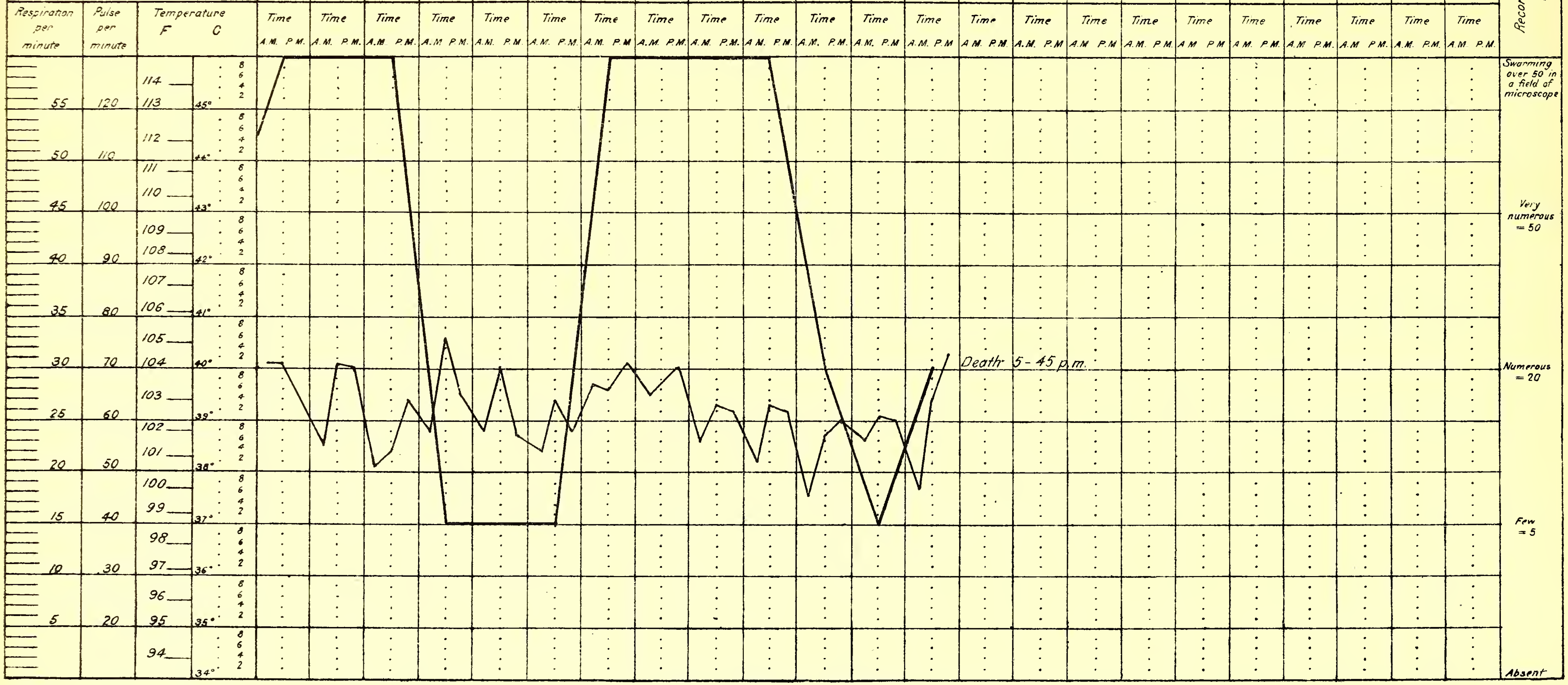
Drawn & Litho: Govt. Photozinco: Office Poona 1892.

Age ____ Sex ____ Colour ____

Age ________ Sex ________ Colour ________

Disease ________ Date of Attack ________ Result ________ Date of Result ________ Register No. XX ________

Dates of Observation.	Oct. 9	10	11	12	13	14	15	16	17	18	19	20	21
Days of Disease	29	30	31	32	33	34	35	36	37	38	39	40	41
Organisms in Blood	S	S	S	F	F	F	S	S	S	S	N	F	N



(S. 415)

Hæmatozoon curve ————

Temperature …….

Drawn & Litho: Govt Photozinco: Office Poona 1892.

when the animal received the poison into the system and consequently also in pronouncing in the case of animals (which have been kept in localities where Surra is prevalent, and which may have been exposed to the contagium) whether they are safe from the disease or not.

(iii). The difficulty, which may exist in deciding the source from which the contagium was imbibed, as in this case the first dose of blood containing the hæmatozoa was given in water 130 days before the rise in the temperature and the discovery of the hæmatozoon in the blood.

(iv). The fever in this case, as the charts show, was of a well marked relapsing type, and exhibits six distinct relapses, but with no regularity as to the periods during which they lasted. The appearance and increase in numbers of the hæmatozoa in the blood was more or less accompanied by a corresponding rise of the temperature.

(v). The urine throughout the duration of this case remained alkaline until six days previous to death when it became acid, a point which has been noticed in other cases.

CASE No. XXVI.—GREY COUNTRY-BRED HORSE, *aged, in fair condition and apparently healthy.*

June 21*st*, 1891.—Temp. A.M. 37·4°C. Temp. P.M. 37·8°C. Blood healthy.

,, 22*nd*.—Temp. A.M. 37·2°C. Temp. P.M. 37·4°C. ,, ,,

3 P.M.—Two hundred cubic centimetres of blood were removed from the heart of Horse No. XXII, one hour and ten minutes after death, and were administered by the mouth to this animal. The blood given contained very numerous hæmatozoa an hour previous to death.

,, 23*rd*.—Temp. A.M. 37·7°C. P.M. 37·5°C. No hæmatozoa in the blood.
,, 24*th* ,, ,, 37·6°C. ,, 37·6°C. ,, ,, ,, ,,
,, 25*th* ,, ,, 37°C. ,, 37·2°C. ,, ,, ,, ,,
,, 26*th* ,, ,, 37·3°C. ,, 37·3°C. ,, ,, ,, ,,
,, 27*th* ,, ,, 36·5°C. ,, 37·4°C. ,, ,, ,, ,,
,, 28*th* ,, ,, 37·1°C. ,, 37·3°C. ,, ,, ,, ,,
,, 29*th* ,, ,, 36·1°C. ,, 36·7°C. ,, ,, ,, ,,
,, 30*th* ,, ,, 37°C. ,, 37·1°C. ,, ,, ,, ,,
July 1*st* ,, ,, 36·2°C. ,, 36·5°C. ,, ,, ,, ,,
,, 2*nd* ,, ,, 36·6°C. ,, 36·1°C. ,, ,, ,, ,,
,, 3*rd* ,, ,, 36·2°C. ,, 37·2°C. ,, ,, ,, ,,
,, 4*th* ,, ,, 35·5°C. ,, 37·1°C. ,, ,, ,, ,,
,, 5*th* ,, ,, 36·3°C. ,, 36·5°C. ,, ,, ,, ,,

,, 6*th*.—There is slight œdema on the inner side of the right thigh. Temp. A.M. 35·8°C. No hæmatozoa in the blood.

Temp. P.M. 37·1°C.

,, 7*th*.—Temp. A.M. 36·6°C. P.M. 37·1 °C. No hæmatozoa in the blood.
,, 8*th* ,, ,, 36·8°C. ,, 37·1°C. ,, ,, ,, ,,
,, 9*th* ,, ,, 36·6°C. ,, 37·1°C. ,, ,, ,, ,,
,, 10*th* ,, ,, 36·5°C. ,, 37·1°C. ,, ,, ,, ,,
,, 11*th* ,, ,, 36·1°C. ,, 37°C. ,, ,, ,, ,,
,, 12*th* ,, ,, 36·2°C. ,, 37·1°C. ,, ,, ,, ,,

,, 13*th*.—There are ecchymoses on both conjunctival membranes. The animal is losing flesh, especially over the ribs and flanks. Temp. A.M. 36°C. No hæmatozoa in the blood. Temp. P.M. 37°C.

,, 14*th*.—Temp. A.M. 36·1°C. P.M. 37·8°C. No hæmatozoa in the blood.
,, 15*th* ,, ,, 35·8°C. ,, 37·6°C. ,, ,, ,, ,,
,, 16*th* ,, ,, 36·3°C. ,, 38·3°C. ,, ,, ,, ,,
,, 17*th* ,, ,, 37·7°C. ,, 38·4°C. ,, ,, ,, ,,
,, 18*th* ,, ,, 36·4°C. ,, 38·2°C. ,, ,, ,, ,,
,, 19*th* ,, ,, 37°C. ,, 37·4°C. ,, ,, ,, ,,
,, 20*th* ,, ,, 36·8°C. ,, 36·8°C. ,, ,, ,, ,,
,, 21*st* ,, ,, 37·2°C. ,, 37·6°C. ,, ,, ,, ,,
,, 22*nd* ,, ,, 36·3°C. ,, 37·8°C. ,, ,, ,, ,,
,, 23*rd* ,, ,, 35·8°C. ,, 37·3°C. ,, ,, ,, ,,
,, 24*th* ,, ,, 36·°C. ,, 37·2°C. ,, ,, ,, ,,
,, 25*th* ,, ,, 36·7°C. ,, 37·1°C. ,, ,, ,, ,,
,, 26*th* ,, ,, 36·6°C. ,, 37·3°C. ,, ,, ,, ,,
,, 27*th* ,, ,, 37·°C. ,, 37·2°C. ,, ,, ,, ,,
,, 28*th* ,, ,, 36·4°C. ,, 37·3°C. ,, ,, ,, ,,
,, 29*th* ,, ,, 36·1°C. ,, 37·1°C. ,, ,, ,, ,,
,, 30*th* ,, ,, 36·6°C. ,, 37°C. ,, ,, ,, ,,
,, 31*st* ,, ,, 36·4°C. NOON 37·6°C., P.M. 37·3°C. No hæmatozoa in the blood.
August 1*st* ,, ,, 37°C. P.M. 36·8°C. No hæmatozoa in the blood.
,, 2*nd* ,, ,, 36·3°C. ,, 37·1°C. ,, ,, ,, ,,
,, 3*rd* ,, ,, 37°C. ,, 37·4°C. ,, ,, ,, ,,
,, 4*th* ,, ,, 37·1°C. ,, 37·2°C. ,, ,, ,, ,,
,, 5*th* ,, ,, 36·8°C. ,, 37·1°C. ,, ,, ,, ,,
,, 6*th* ,, ,, 36·2°C. ,, 37·2°C. ,, ,, ,, ,,

August	*7th.*—	Temp.	A.M.	36·5°C.	P.M.	37°C.			No hæmatozoa in the blood.
„	*8th*	„	„	36·5°C.	„	36·8°C.			„
„	*9th*	„	„	36·4°C.	„	37°C.			„
„	*10th*	„	„	36·7°C.	„	37·1°C.			„
„	*11th*	„	„	36·6°C.	„	37°C.			„
„	*12th*	„	„	35·7°C.	„	36·8°C.			„
„	*13th*	„	„	35·8°C.	„	37°C.			„
„	*14th*	„	„	36·7°C.	„	36·4°C.			„
„	*15th*	„	„	36·6°C.	„	37°C.			„
„	*16th*	„	„	36·5°C.	„	37·3°C.			„
„	*17th*	„	„	37·1°C.	„	37·4°C.			„
„	*18th*	„	„	37·1°C.	„	37·4°C.			„
„	*19th*	„	„	36·8°C.	„	36·5°C.			„
„	*20th*	„	„	35·8°C.	„	35·7°C.			„
„	*21st*	„	„	36·1°C.	„	37·1°C.			„
„	*22nd*	„	„	36·4°C.	„	36·6°C.			„
„	*23rd*	„	„	36·2°C.	„	36·6°C.			„
„	*24th*	„	„	36·3°C.	„	36·7°C.			„
„	*25th*	„	„	36·4°C.	„	36·7°C.			„
„	*26th*	„	„	36·4°C.	„	37°C.			„
„	*27th*	„	„	36·5°C.	„	37·1°C.			„
„	*28th*	„	„	36·8°C.	„	37·2°C.			„
„	*29th*	„	„	36·7°C.	„	37·1°C.			„
„	*30th*	„	„	35·8°C.	„	37·1°C.			„
„	*31st*	„	„	36·7°C.	„	36·8°C.			„
Sept.	*1st*	„	„	36·6°C.	„	37·7°C.			„
„	*2nd*	„	„	37°C.	„	37·3°C.			„
„	*3rd*	„	„	36·1°C.	„	37·5°C.			„
„	*4th*	„	„	36·7°C.	„	37·2°C.			„
„	*5th*	„	„	36·5°C.	„	37·4°C.			„
„	*6th*	„	„	36·8°C.	„	37°C.			„
„	*7th*	„	„	36·3°C.	„	37·1°C.			„
„	*8th*	„	„	36·7°C.	„	37°C.			„
„	*9th*	„	„	36·3°C.	„	37·1°C.			„
„	*10th*	„	„	36·7°C.	„	37·1°C.			„
„	*11th*	„	„	36·3°C.	„	37·1°C.			„
„	*12th*	„	„	36·4°C.	„	37·2°C.			„
„	*13th*	„	„	37·4°C.	„	37·2°C.			„
„	*14th*	„	„	36·6°C.	„	37·1°C.			„
„	*15th*	„	„	36·2°C.	„	37·6°C.			„
„	*16th*	„	„	37·3°C.	„	37·5°C.			„
„	*17th*	„	„	37·1°C.	NOON	37·4°C.,	P.M.	37·2°C.	No hæmatozoa in the blood.
„	*18th*	„	„	36·4°C.	„	37·4°C.	„	37·7°C.	„
„	*19th*	„	„	36·7°C.	„	38·1°C.	„	36·7°C.	„
„	*20th*	„	„	37·2°C.	„	37·5°C.	„	36·8°C.	„
„	*21st*	„	„	37·3°C.	„	37·4°C.	„	37·8°C.	„
„	*22nd*	„	„	37·2°C.	„	37·7°C.	„	37·6°C.	„
„	*23rd*	„	„	37°C.	„	38·2°C.	„	37·6°C.	„
„	*24th*	„	„	36·7°C.	„	37·4°C.	„	37·8°C.	„
„	*25th*	„	„	37°C.	„	37·7°C.	„	37·6°C.	„
„	*26th*	„	„	37·6°C.	„	37·7°C.	„	37·8°C.	„
„	*27th*	„	„	36·9°C.	„	37·3°C.	„	37·7°C.	„
„	*28th*	„	„	37·1°C.	„	37·6°C.	„	37·4°C.	„
„	*29th*	„	„	36·7°C.	„	37·5°C.	„	37·5°C.	„
„	*30th*	„	„	37·8°C.	„	37·8°C.	„	37·6°C.	„
October	*1st*	„		36·6°C.	„	37·5°C.	„	37·2°C.	„

October	*2nd.*—Temp.	A.M.	36·8°C.	NOON	36·7°C.	P.M.	37·5°C.	No hæmatozoa in the blood.
„	*3rd*	„	37·2°C.	„	38·2°C.	„	37·6°C.	„
„	*4th*	„	37·6°C.	„	38·1°C.	„	38°C.	„
„	*5th*	„	37°C.	„	37·7°C.	„	37·4°C.	„
„	*6th*	„	37·1°C.	„	37·6°C.	„	38·5°C.	„
„	*7th*	„	37·7°C.	„	38°C.	„	38·3°C.	„
„	*8th*	„	37·8°C.	„	38°C.	„	38·3°C.	„
„	*9th*	„	37·3°C.	„	38·1°C.	„	37·8°C.	„
„	10*th*	„	37·1°C.	„	38°C.	„	38·3°C.	„
„	11*th*	„	37·1°C.	„	38°C.	„	38·3°C.	„
„	12*th*	„	37·5°C.	„	37·5°C.	„	37·8°C.	„
„	13*th*	„	36·6°C.	„	37·8°C.	„	37·4°C.	„
„	14*th*	„	36·8°C.	„	37·6°C.	„	37·4°C.	„
„	15*th*	„	37°C.	„	37·4°C.	„	38·2°C.	„
„	16*th*	„	36·6°C.	„	37·2°C.	„	37·7°C.	„
„	17*th*	„	36·7°C.	„	38°C.	„	38°C.	„
„	18*th*	„	36·2°C.	„	38·3°C.	„	37·8°C.	„
„	19*th*	„	37·2°C.	„	38·3°C.	„	38·3°C.	„
„	20*th*	„	37·3°C.	„	37·2°C.	„	38·2°C.	„
„	21*st*	„	36·4°C.	„	38·1°C.	„	38°C.	„
„	22*nd*	„	37·1°C.	„	38°C.	„	38·1°C.	„
„	23*rd*	„	37·3°C.	„	38·3°C.	„	38·2°C.	„
„	24*th*	„	37·1°C.	„	38·6°C.	„	38·4°C.	„
„	25*th*	„	37·8°C.	„	38·3°C.	„	38·3°C.	„
„	26*th*	„	36·8°C.	„	38·2°C.	„	38·4°C.	„
„	27*th*	„	37·5°C.	„	38·4°C.	„	37·6°C.	„
„	28*th*	„	38·2°C.	„	38·4°C.	„	38°C.	„
„	29*th*	„	37·8°C.	„	38·5°C.	„	38·2°C.	„
„	30*th*	„	37·8°C.	„	38·8°C.	„	38·6°C.	„
„	31*st*	„	37·7°C.	„	38·6°C.	„	38·2°C.	„
November	1*st*	„	38·2°C.	„	38·2°C.	„	38·3°C.	„
„	2*nd*	„	37·2°C.	„	37·5°C.	„	38·3°C.	„
„	3*rd*	„	36·7°C.	„	37·6°C.	„	37·8°C.	„
„	4*th*	„	38·1°C.	„	38·1°C.	„	38·8°C.	„
„	5*th*	„	37·3°C.	„	38·3°C.	„	39·2°C.	„
„	6*th*	„	37·6°C.	„	38·8°C.	„	39·2°C.	„
„	7*th*	„	39·3°C.	„	39·6°C.	„	39·4°C.	„
„	8*th*	„	39·1°C.	„	39·2°C.	„	39·5°C.	„
„	9*th*	„	39·7°C.	Death 11 A. M.				

AUTOPSY.—1-30 P. M.

The body is somewhat emaciated.

Thorax.—There is no fluid in the pleural cavities and there are no adhesions.

Right Lung.—The apex is dark in colour and is the seat of well marked emphysema, several of the emphysematous blebs being as large as small walnuts and filled with blood-stained serum. There is a localized patch in the centre of the anterior lobe which is consolidated; and on section the lobules are found to be divided off individually or in small groups, as in Pleuro-pneumonia of cattle, by a layer of light lemon-coloured exudation. This condition is localized to an area 5″ × 5″. The pleural covering on the superior surface of the organ is thickened and somewhat white in colour, due to old inflammatory changes; but the tissue presents a healthy appearance.

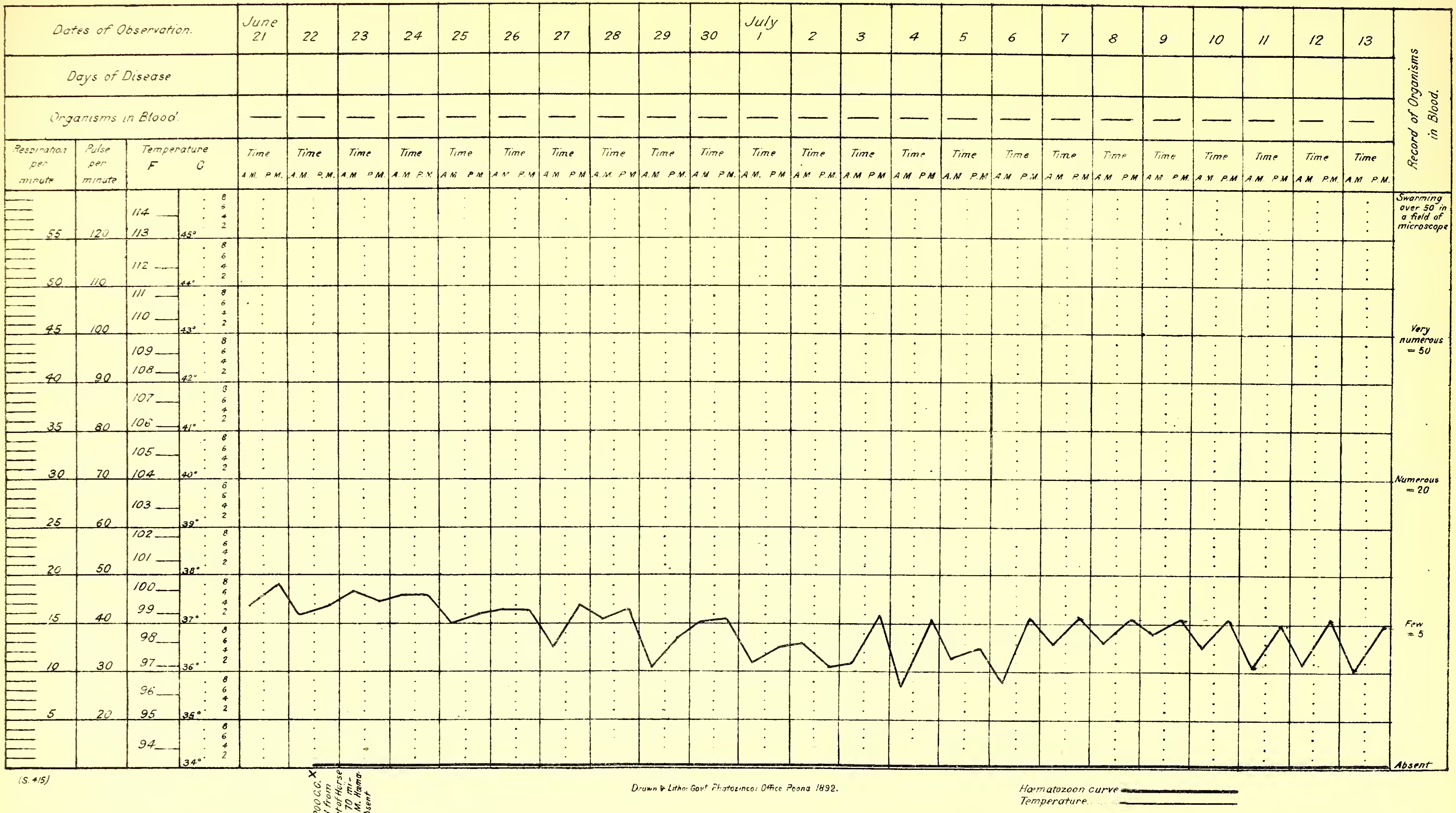
Left Lung.—The apex and free edges are the seat of localized emphysema, and the pleura covering the superior surface is thickened and presents the same changes as observed in the right. *On section,* the tissues are healthy.

Heart.—Weighs 4 lbs., externally the organ presents a healthy appearance. *On section,* the cavities are full of semi-fluid blood. There were no ecchymoses or extravasations of any kind under the endocardial lining. The valves are healthy.

Liver.—Is dark in colour and weighs 8 lbs. and 11 ozs. The surface of the organ is dotted over with small yellow concretions which are found to pervade the substance of the organ on section.

Horse ______ Age ______ Sex ______ Colour, Grey ______

Disease ______ Date of Attack ______ Result ______ Date of Result ______ Register No. XXVI. ______



(S. 415)

× Given 200 C.C. of blood from the heart of Horse No. XXII 70 minutes P.M. Hæmatozoa absent

Drawn & Litho: Govt Photozinco: Office Poona 1892.

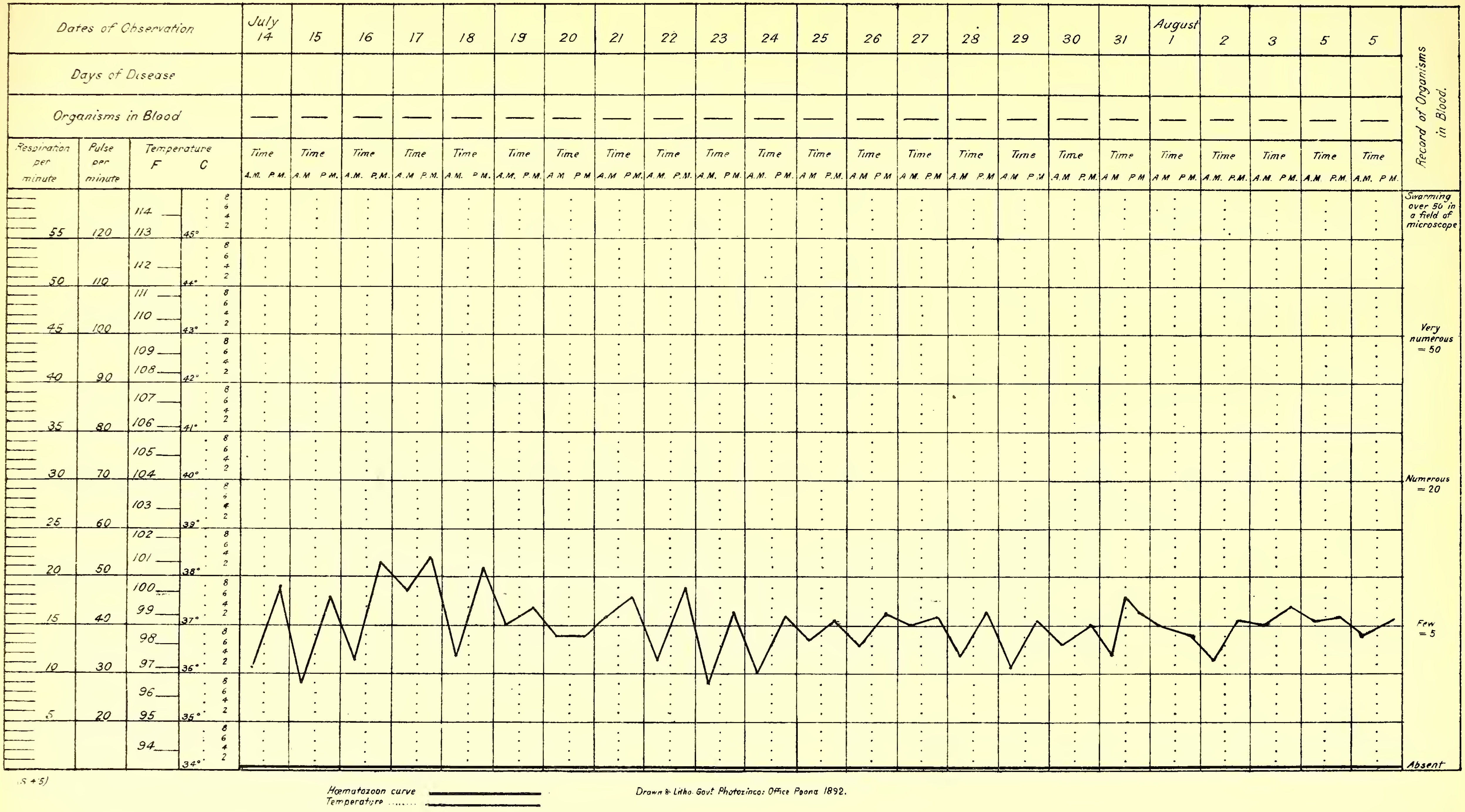
Age

Sex

Colour

Age ______ Sex ______ Colour ______

Disease ______ Date of Attack ______ Result ______ Date of Result ______ Register No. XXVI ______



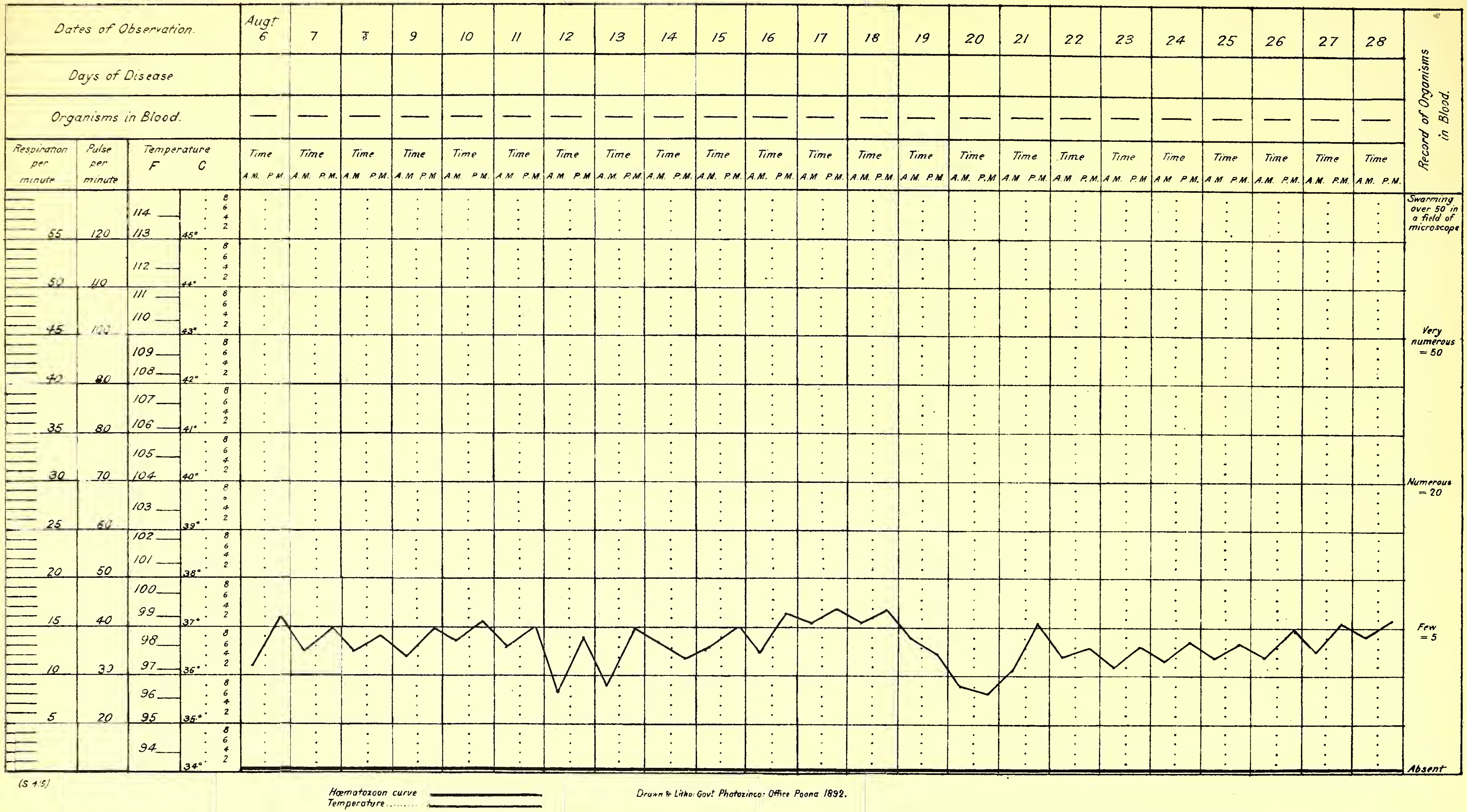
(S + 5)

Drawn & Litho. Govt. Photozinco: Office Poona 1892.

Age
Sex
Colour

Age ______ Sex ______ Colour ______

Disease ______ Date of Attack ______ Result ______ Date of Result ______ Register No. XXVI ______



(S 4.5)

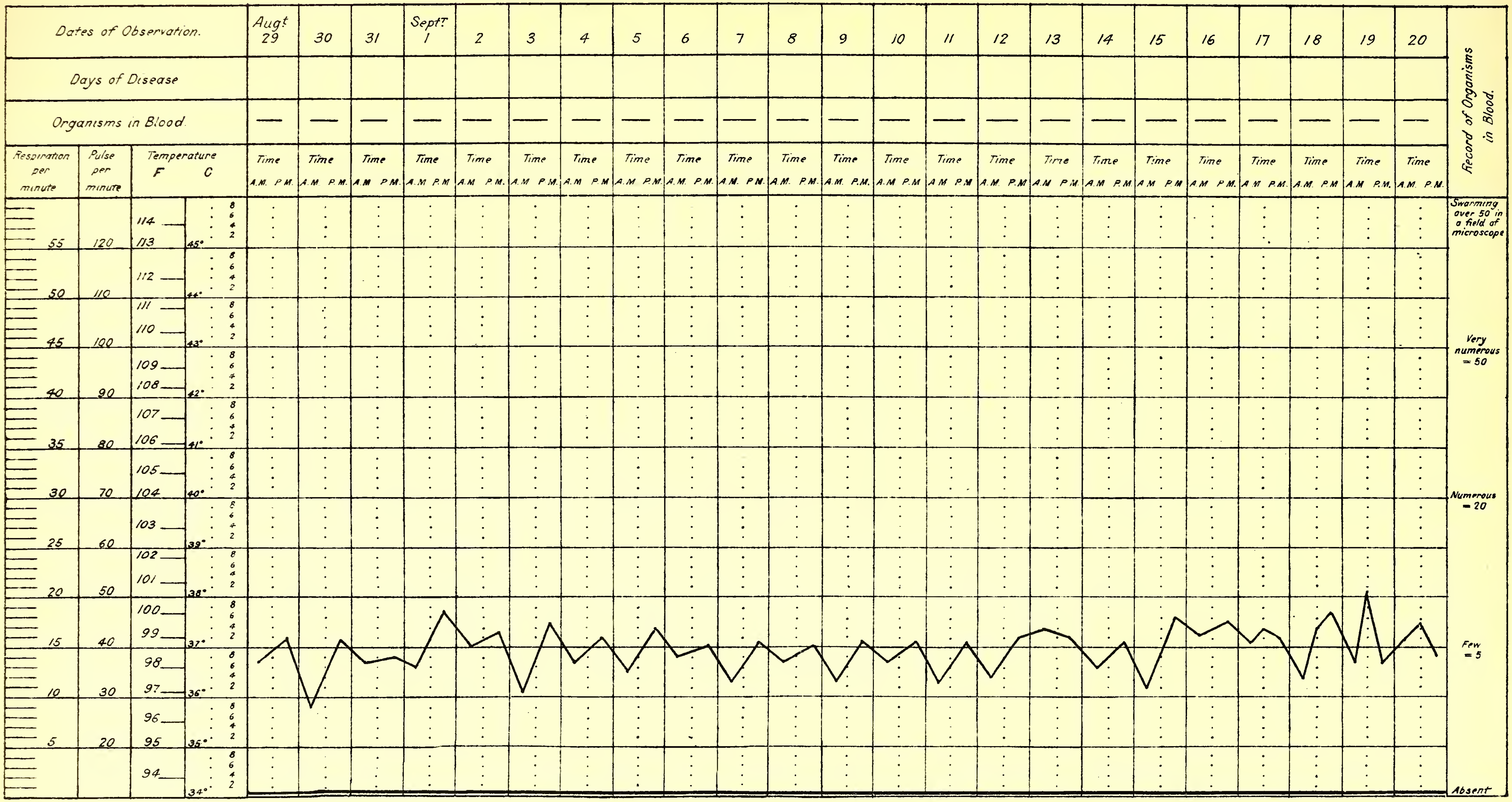
Drawn & Litho: Gov^t Photozinco: Office Poona 1892.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age ______ Sex ______ Colour ______

Disease ______ Date of Attack ______ Result ______ Date of Result ______ Register No. XXVI



(S 415)

Hæmatozoon curve ——
Temperature........ ——

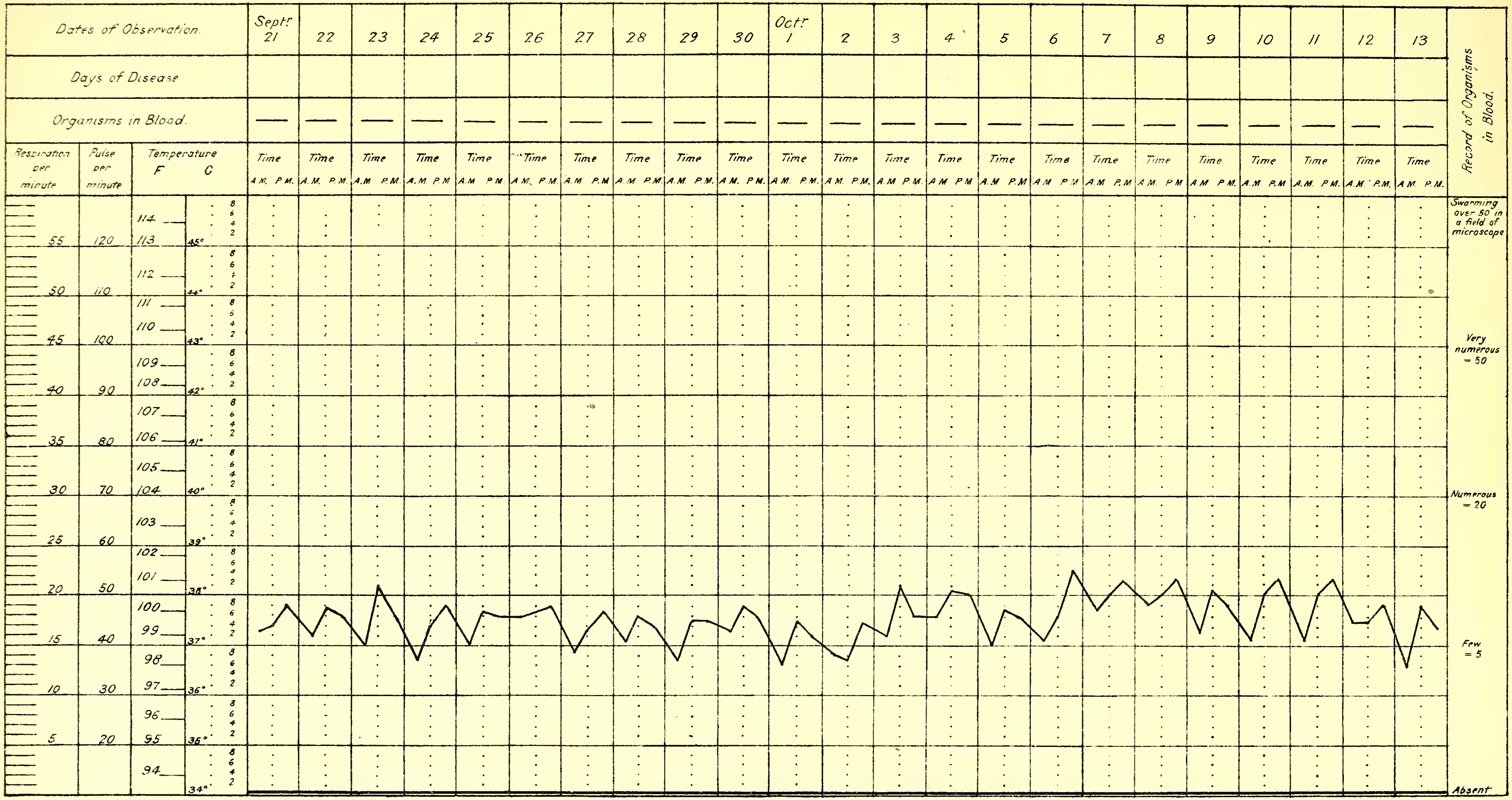
Drawn & Litho. Govt. Photozinco: Office Poona 1892.

RECORDING OF TEMPERATURE, PULSE AND RESPIRATION.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age ______ Sex ______ Colour ______

Disease ______ Date of Attack ______ Result ______ Date of Result ______ Register No. XXVI. ______



(S 415)

Hæmatozoon curve
Temperature……..

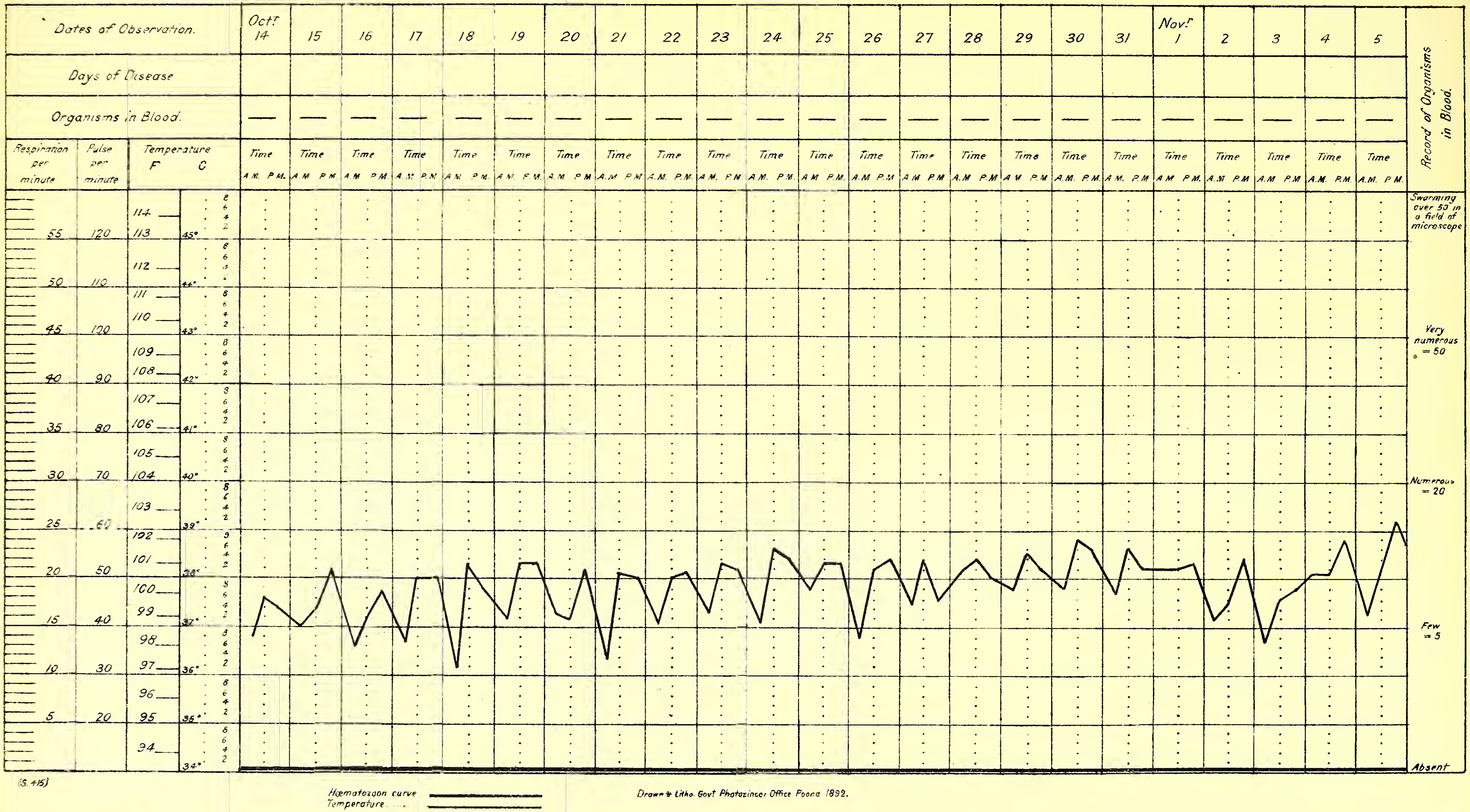
Drawn & Litho. Govt. Photozinco: Office Poona 1892.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age ______ Sex ______ Colour ______

Disease ______ Date of Attack ______ Result ______ Date of Result ______ Register No. XXVI. ______



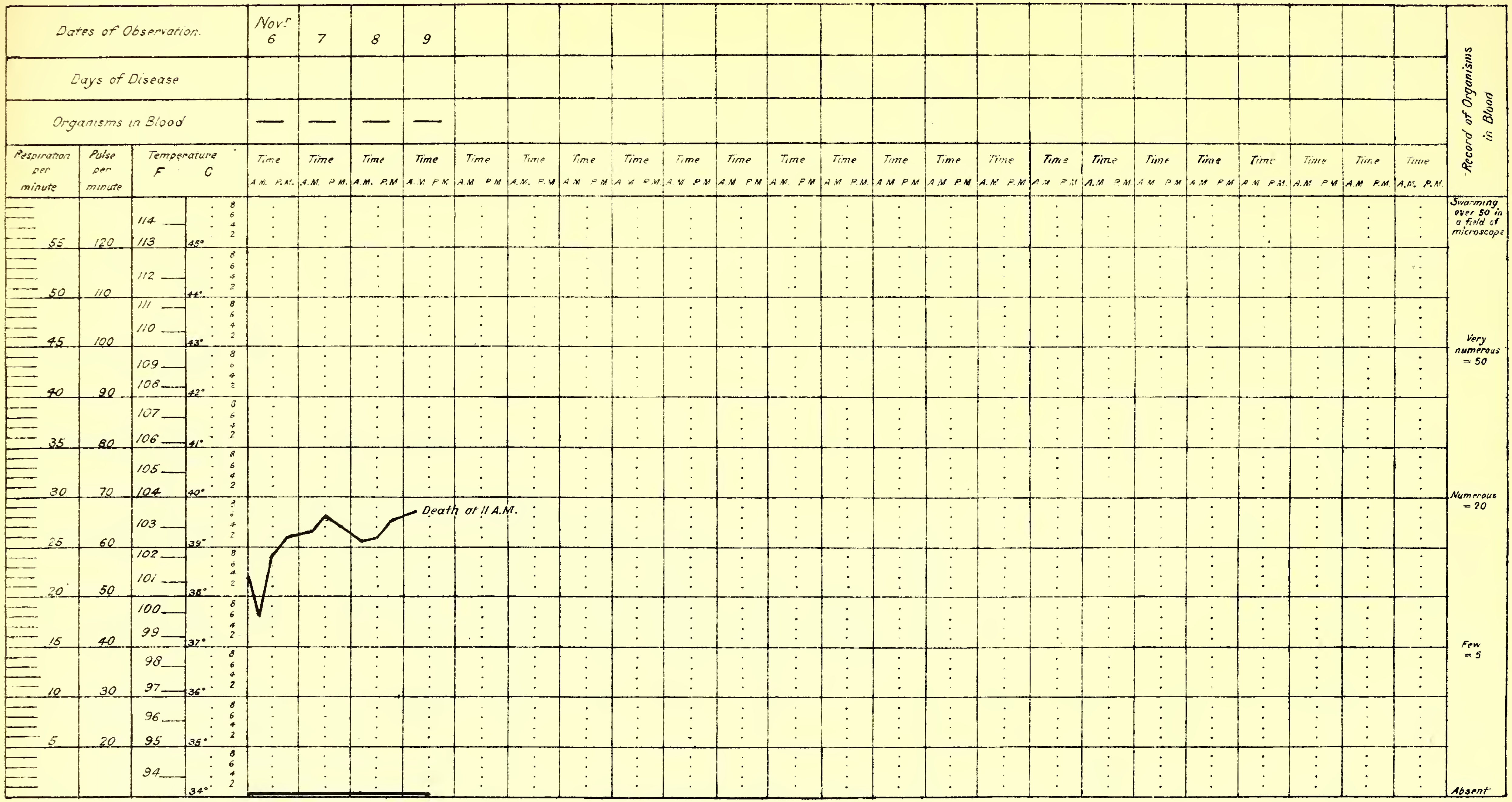
(S. 415)

Drawn & Litho. Govt. Photozinco: Office Poona 1892.

Age ______ Sex ______ Colour ______

Age ____ Sex ____ Colour ____

Disease ____ Date of Attack ____ Result ____ Date of Result ____ Register No. XXVI____



(S. 415).

Hæmatozoon curve
Temperature.......

Drawn & Litho. Govt. Photozinco: Office Poona 1892.

Spleen.—Weighs 1 lb. 8 ozs., is small, and there are no petechiæ on the surface of the capsule. On section, the tissues are firm and healthy.

Kidneys.—Right 1 lb. 5 ozs., Left 1 lb. 4 ozs. The capsules strip easily, and present a mottled condition of the surfaces of both organs; but on section, no pathological changes are present.

The chief point of interest in this case centres on the following facts :—

1.—That 200 cubic centimetres of blood removed from the heart of an animal, one hour and ten minutes after death and administered by the mouth to an healthy animal, failed to reproduce the disease, although an hour previous to death, the blood was examined microscopically and found to contain very numerous hæmatozoa.

2.—That a circumscribed patch of pneumonia was found in one lung presenting peculiar pathological characteristics, *viz.*, a dividing off of the lobules, singly or in groups, by jelly-like exudation; which same condition of the lung has on several occasions been noted at the autopsy of animals which have succumbed to Surra at varying periods after inoculation, and was considered to be a complication of that disease.

RECORDS OF URINE.

Animal, Grey C. B. entire Horse No. XXVI. Date { *Given 200c.c. Surra blood by mouth, 22nd June 1891.*
Death 9th November 1891.

Disease, Surra not communicated.

Date.	Quantity.	Colour.	Re-action.	Sp. Gravity.	Albumen.	Phosphates.	REMARKS.
1891.							
September. 25	...	Turbid light-brown	Alkaline	1,020	No	No	Striated spheres, large and small, Carbonate of Lime Octahedral and dumb-bells, ovoid crystals. Oxalate of Lime.
,, 28	...	Do. yellow viscid	Do.	1,030	No	No	,, ,,
,, 29	...	Do. do.	Do.	1,024	No	No	,, ,,
,, 30	...	Do. do.	Do.	1,030	No	No	,, ,,
October. 1	...	Do. do.	Do.	1,020	No	No	,, ,,
,, 2	...	Do. do.	Do.	1,026	No	No	,, ,,
,, 3	...	Do. orange viscid	Do.	1,018	No	No	,, ,,
,, 4	...	Do. do.	Do.	1,038	No	No	,, ,,
,, 5	...	Do. yellow viscid	Do.	1,020	No	No	,, ,,
,, 6	...	Do. do.	Do.	1,034	No	No	,, ,,
,, 7	...	Do. do.	Do.	1,017	No	No	
,, 8	...	Do. do.	Do.	1,032	No	No	,, ,,
,, 9	...	Do. do.	Do.	1,024	No	No	,, ,,
,, 10	...	Do. do.	Do.	1,026	No	No	,, ,,
,, 11	...	Do. do.	Do.	1,040	No	No	,, ,,
,, 12	...	Do. do.	Do.	1,038	No	No	,, ,,
,, 13	...	Do. do.	Do.	1,034	No	No	,, ,,
,, 14	...	Do. do.	Do.	1,034	No	No	,, ,,
,, 15	...	Do. do.	Do.	1,024	No	No	,, ,,
,, 16	...	Do. canary-yellow viscid.	Do.	1,014	No	No	,, ,,
,, 17	...	Do. orange viscid	Do.	1,031	No	No	,, ,,
,, 18	...	Do. greenish-yellow viscid.	Do.	1,036	No	No	,, ,,
,, 19	...	Do. dirty-orange viscid.	Do.	1,040	No	No	,, ,,
,, 20	...	Do. do.	Do.	1,034	No	No	,, ,,
,, 21	...	Do. do.	Do.	1,028	No	No	,, ,,
,, 22	...	Do. dirty-brown viscid.	Do.	1,050	No	No	,, ,,
,, 23	...	Do. dirty-orange viscid.	Do.	1,048	No	No	,, ,,
,, 24	...	Do. dirty-yellow viscid.	Do.	1,040	No	No	,, ,,
,, 25	...	Do. do.	Do.	1,040	No	No	,, ,,
,, 26	...	Do. do.	Do.	1,052	No	No	,, ,,
,, 27	...	Do. pea-soup colour viscid.	Do.	1,050	No	No	,, ,,
,, 28	...	Do. dirty-lemon viscid.	Do.	1,012	No	No	,, ,,
,, 29	...	Do. dirty-green viscid.	Do.	1,025	No	No	,, ,,
,, 30	...	Do. pea-soup viscid.	Do.	1,046	No	No	,, ,,
,, 31	...	Do. dirty-brown viscid.	Do.	1,055	No	No	,, ,,
November. 1	...	Do. faintly yellow viscid.	Do.	1,018	No	No	,, ,,
,, 2	...	Do. dirty-yellow viscid.	Do.	1,025	No	No	,, ,,
,, 3	...	Do. greenish-brown viscid.	Do.	1,038	No	No	,, ,,
,, 4	...	Do. greenish-yellow viscid.	Do.	1,034	No	No	,, ,,
,, 5	...	Do. do.	Do.	1,042	No	No	,, ,,
,, 6	...	Do. greenish-brown viscid.	Do.	1,048	No	No	,, ,,
,, 7	...	Do. do.	Do.	1,032	No	No	,, ,,
,, 8	...	Do. do.	Do.	1,052	No	No	,, ,,

APPENDIX III.

EXPERIMENTAL CASES.

DIRECT INJECTION OF BLOOD INTO THE JUGULAR VEIN

HORSES XIV, XV.

CASE No. XIV—GREY C. B. GALLOWAY *Entire aged, in good health and fair condition.*

30*th January*, 1891.—7C.C. of blood from Horse No. XI, containing numerous hæmatozoa, were injected directly into the right Jugular Vein of this animal. Temp. 5 P.M. 37·5°C.

31*st.*—The animal appears in exactly the same condition as it did previous to the injection of Surra blood. Temp. A.M. 37·3°C. No hæmatozoa in the blood. Temp. P.M. 39·5°C.

1*st February.*—Condition unchanged. Temp. A. M. 40·1°C. No hæmatozoa in the blood. Temp. P. M. 40·°C.

2*nd.*—The animal is rather dull; the appetite is good however; but the pulse and respirations are accelerated. Temp. A.M, 39·3°C. No hæmatozoa in the blood. Temp. P.M. 38·7°C.

3*rd.*—The condition of the animal is unchanged. Temp. A.M. 36·2°C. No hæmatozoa in the blood. Temp. P.M. 38·7°C.

4*th.*—No particular change to notice in the animal's condition. There are several very small petechiæ on the conjunctival membranes. Appetite good. Temp. A.M. 38·4°C. There are a few hæmatozoa in the blood. Temp. P. M. 39·8°C.

5*th.*—Condition unchanged. Temp. A.M. 39·7°C. A few hæmatozoa in the blood. Temp. P.M. 40·1°C.

6*th.*—Animal dull, but the appetite remains good. Temp. A.M. 39·4°C. Hæmatozoa very numerous in the blood. Temp. P.M. 39·6°C.

7*th.*—The animal appears very dull; and there are more petechiæ on the conjunctival membranes. The appetite is good, and the evacuations healthy. Temp. A.M. 39·5°C. Hæmatozoa very numerous in the blood. Temp. P.M. 39·7°C.

8*th.*—Condition unchanged. Temp. A.M. 39·8°C. Hæmatozoa very numerous in the blood. Temp. P.M. 39·8°C.

9*th.*—The animal is somewhat brighter this morning. The appetite is good, and the evacuations natural. Temp. A.M. 38·5°C. Hæmatozoa are few in the blood. It has been decided to try the effect of subcutaneous injections of Oleum Terebinthinæ on the hæmatozoa. Accordingly four cubic centimetres of it were injected subcutaneously on each side of the neck, making 8 C. C. in all. No visible effect. Temp. P.M. 38·8°C.

10*th.*—The condition of the animal is unchanged, the appetite good, and the evacuations natural. Temp. A.M. 38·4°C. Eight cubic centimetres of Ol : Terebinthinæ were injected into the right internal Jugular Vein at 12-40 P.M. At 12-45 P.M. the pulse from being fairly good, has become barely perceptible; the respirations have increased to 60 per minute from 33, and there are muscular twitchings in both flanks. The animal lies down, and almost immediately assumes the upright position again. Injected subcutaneously at 1 P.M. Liq : Ammoniæ and water, equal parts, to one drachm; and this was followed, twenty minutes later, by a second injection. Liquor Ammoniæ mxl Aquam ad ʒi. The pulse shortly afterwards became stronger, and the animal lost all discomfort produced by the Ol : Terebinthinæ. On examination of the blood, the hæmatozoa are few in number, but these are decidedly torpid, and some appear to have lost all power of movement and are most probably dead. Temp. P.M. 38·°C.

11*th.*—The animal has quite returned to the condition it presented previous to the subcutaneous injection yesterday. Temp. A.M. 38·5°C. Hæmatozoa few in the blood. Temp. P.M. 38·8°C.

12*th.*—This morning there is some œdema lying subcutaneously along the course of the trachea, and spreading over the pectoral muscles. It is also well marked at the point of injection of the Liquor : Ammoniæ and water, on the side of the neck. Temp. A.M. 37·8°C. Hæmatozoa absent from the blood. Temp. P.M. 38·2°C.

13*th.*—The condition of the animal remains unchanged. Temp. A.M. 37·8°C. The hæmatozoa are numerous in the blood. Temp. P.M. 38·2°C.

14*th.*—The animal appears fairly well, the appetite remains good, and the pulse is strong. Injected Ol: Terebinthinæ 12C.C. into the trachea. Temp. A.M. 39.3°C. Seven or eight minutes after the injection, the animal showed signs of colicky pains, which however quickly subsided. There was increased peristalsis and escape of flatus per anum. Temp. P.M. 39·5°C.

15*th.*—Condition is satisfactory; appetite good; the visible mucous membranes are not discoloured; but the petechiæ have considerably faded. Temp. A.M. 38°C. The hæmatozoa are very numerous and active in the blood. Temp. P.M. 38·4°C.

16*th.*—Condition unchanged. Temp. A.M. 38·7°C. Ol: Terebinthinæ 8 C.C. injected into the trachea. After making a minute incision in the fine skin of the muzzle, the first blood that exuded was found to contain numerous hæmatozoa. Subsequently however several specimens of blood were taken and carefully examined microscopically; but no hæmatozoa were recognized. It would thus appear that all the organisms had, on the injection of the Ol: Terebinthinæ, collected in the superficial capillaries. Temp. P.M. 38·6°C.

17th.—The animal appears dull. There is considerable swelling round the larynx and the upper part of the trachea. The breathing is accelerated and somewhat difficult. Temp. A.M. 38·7°C. There are very numerous hæmatozoa in the blood, but many appear to be more torpid than usual. Temp. P.M. 38·8°C.

18th.—Condition unchanged. There is however no sign of any œdema of the extremities. Temp. A.M. 38·7°C. Hæmatozoa are very numerous in the blood. Temp. P.M. 38·7°C.

19th.—The animal appears very dull this morning; but the appetite continues to be good. Temp. A.M. 38·6°C. The hæmatozoa are very numerous, large and active. Temp. P.M. 38·5°C.

20th.—The condition of the animal is about the same as yesterday. The appetite is good. Temp. A.M. 39·3°C. Hæmatozoa are numerous in the blood. Temp. P.M. 39·6°C.

21st.—There is slight œdema of the limbs, and the sheath is also swollen. Temp. A.M. 39·4°C. Hæmatozoa are very numerous in the blood. Temp. P.M. 39·6°C.

22nd.—Condition unchanged. Temp. A.M. 39·3°C. The hæmatozoa are very numerous and active in the blood. Temp. P.M. 39·5°C.

23rd.—The animal is dull. There are numerous petechiæ on the conjunctival membranes. There is swelling and œdema of the abdominal walls and sheath; and that of the extremities has increased in amount. The appetite remains good, and the evacuations are natural in character. Temp. A.M. 39·2°C. The hæmatozoa are very numerous and active in the blood. Temp. P.M. 39·4°C.

24th.—The animal is becoming very weak, and the limbs more swollen and œdematous. The appetite is however good, in fact very good. Temp. A.M. 38·3°C. The hæmatozoa are very numerous in the blood. Temp. P.M. 38·5°C.

25th.—This morning the animal looks fairly well. The breathing is somewhat shallow, 25 respirations to the minute. The appetite is however voracious. Temp. A.M. 36·5°C. The hæmatozoa are numerous in the blood. Temp. P.M. 36·1°C. The animal this evening is weaker. At 8 P.M. it lay down; and death took place after a very short period of struggling at 11 P.M.

AUTOPSY at 10 A.M., *26th February* 1891.—The body is somewhat emaciated, the limbs are swollen and œdematous, and there is a similar condition of the most dependent part of the abdomen and sheath. On removal of the skin of the neck and on opening the thorax, a considerable amount of yellow coloured material, jelly-like in character, is observed lying on either side of the trachea and passing down into the chest. There is no fluid in either of the pleural cavities, nor adhesions of the visceral and parietal pleuræ. The apices of both lungs are the seat of emphysema. The surfaces of the organs are dotted over with small irregular shaped extravasations of blood which are found to be lying under the visceral pleuræ, but do not appear on section to dip down into the lung tissue. There are also a few hard nodules about the size of a pea, which lie at varying depths in the tissue and which on section are found to be caseous nodules undergoing calcification. These are tolerably easy to enucleate.

Liver.—Large and dark in colour but presents a few lighter coloured patches on its convex surface with injected vessels running over their surface. *On section*, these lighter portions are found to lie superficially. There are some round white bodies about 20 in number and varying in size from $\frac{1}{8}$th to $\frac{1}{4}$th of an inch in diameter dotted over the anterior and posterior surfaces of the organ, and *on section*, a few of these bodies are found dotted through the tissue, and are easily enucleable. The tissues present a dull brown colour, and one can see injected vessels which occupy the central portion of the lobule running towards the hepatic vein.

Spleen.—Somewhat enlarged. Weight 3 lbs. $1\frac{1}{2}$ oz. There are a few extravasations on its surface; and *on section*, the tissue of the organ is fairly firm and healthy.

Kidneys.—The stellate veins are injected at the lower end of both organs. The capsules strip easily, and reveal the presence of many small round purple spots, nearly all the size of a pin's head, lying on the external cortical portion. *On section* these spots are found to dip into the cortical portion and pervade its whole structure. An orange coloured material occupied the lumen of some of the pyramidal tubes.

Stomach.—Healthy.

Bladder.—Normal.

Heart.—Presents numerous extravasations under the visceral pericardium anteriorly and posteriorly. The walls are much hypertrophied, and the right and left ventricles contain decolourized clots which run up into the large vessels. All the valves are healthy.

There are a few extravasations in the right ventricle lying beneath the endocardium; but in the left ventricle, there are many and extensive extravasations of blood. The largest involve for the most part the musculi-papillares.

The small intestines.—Present a few petechiæ dotted over the surface of the gut; but there is no ulceration.

The Cæcum and Colon.—Are full of green fæcal matter, but on careful examination no petechiæ are visible.

Remarks.—On the 31st January, the day following the direct injection of Surra blood into the internal Jugular Vein, the temperature rose rapidly to 40·1°C. and continued high all that and the next day until the evening when it suddenly commenced to fall, and by the morning of the 3rd February, it had fallen nearly 3·5°C. and was as low as 36·2°C. The same evening it again rose 2·5°C. and continued to rise for the next three days when it attained the same height that it had previously done during the period of incubation. The temperature did not again touch the same degree during the 20 days that the animal lived. There was only one day, the 9th, after the appearance of the organism, on which the hæmatozoon was absent from the blood during the whole course of the disease, but on several occasions, abortive attempts were made to disappear. The chief points of interest in this case are:—

(i). That the animal was directly inoculated with blood containing hæmatozoa into the general circulation, and contracted the disease after an incubation-period lasting less than five days.

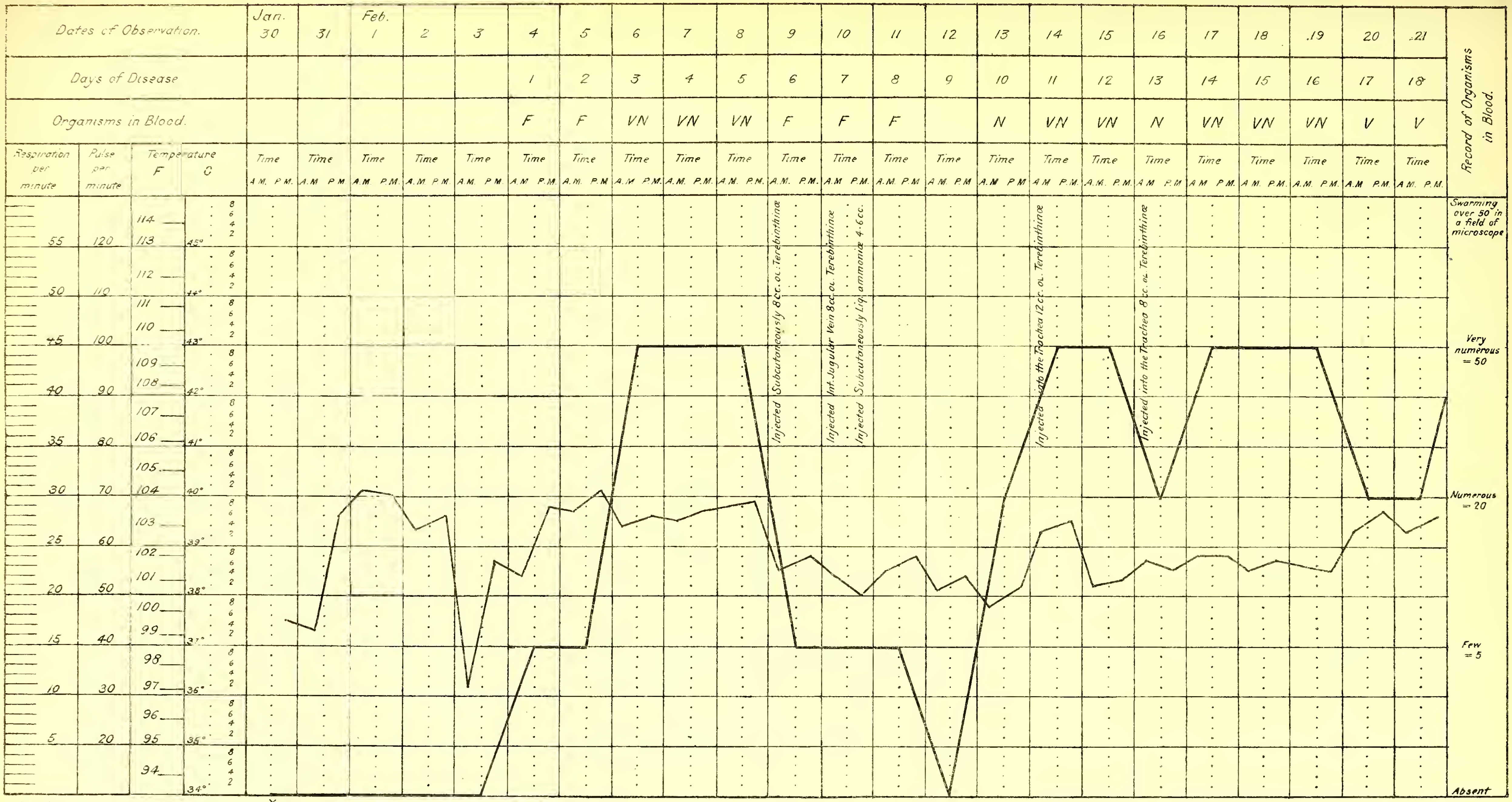
(ii). That a great rise in temperature occurred on the 2nd day after inoculation, lasting until the evening of the 4th and was followed by a sudden fall on the morning of the 5th day.

(iii). That the hæmatozoon was only absent from the blood for 24 hours during the period of 22 days.

(iv). That the injection of Oleum Terebinthinæ had no effect in destroying or reducing the number of hæmatozoa in the blood.

Grey C. B. Galloway ______ Age, Aged ____ Sex, Male ______ Colour, Grey ______

Disease, 'Surra' inoculated ______ Date of Inoculation, 30 Jan. 1891 ____ Result, Death ______ Date of Result, 25 Feb. 91 __ Register No. XIV ______



(S. 4·5)

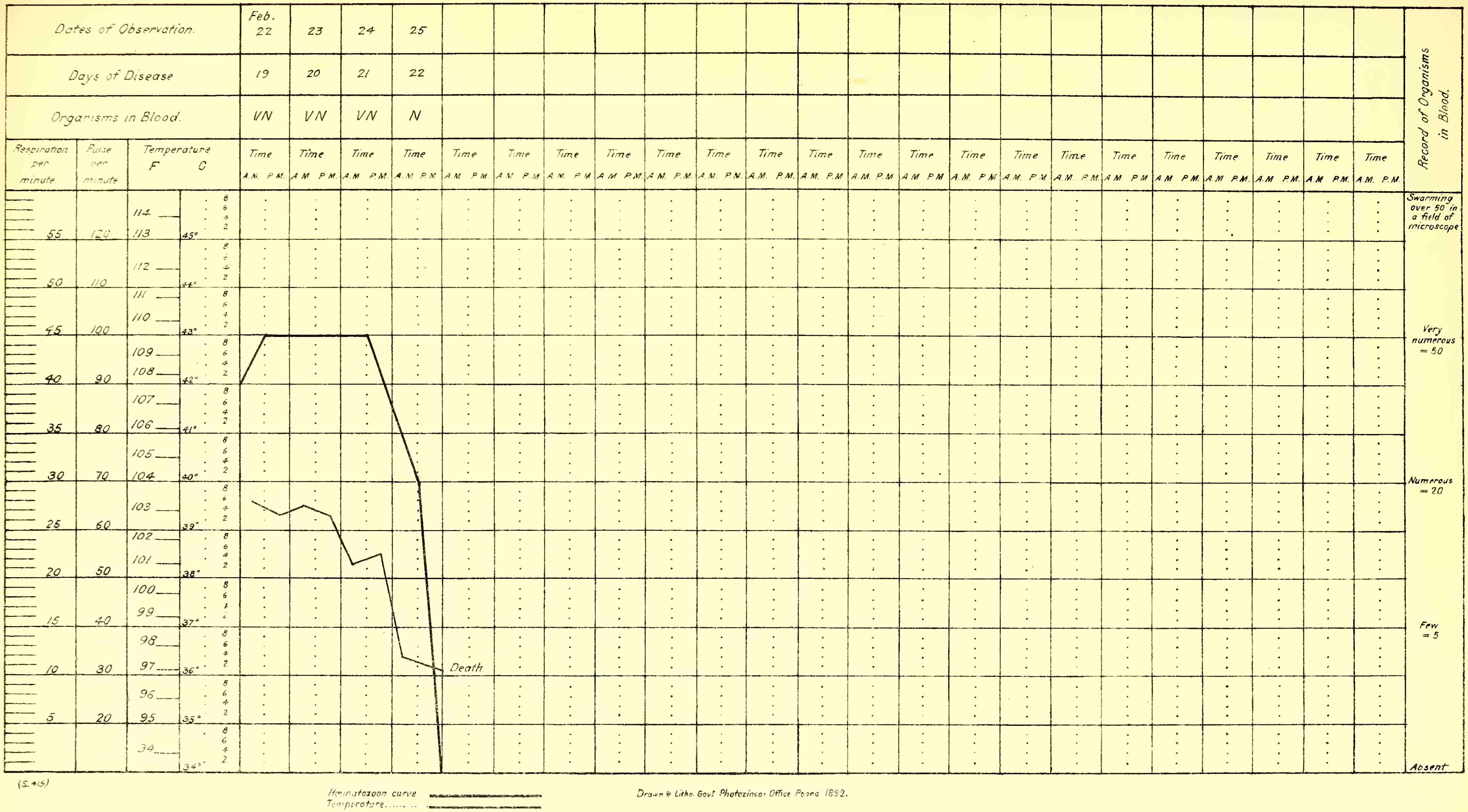
Hæmatozoon curve ————
Temperature .....

Drawn & Litho. Govt. Photozinco: Office Poona 1892.

X 0·7cc. of blood drawn from Horse No. XI containing numerous hæmatozoa were injected directly into the right Jugular Vein.

Age ______ Sex ______ Colour ______

Disease, 'Surra' inoculated ______ Date of Attack ______ Result, Death ______ Date of Result ______ Register No. XIV ______



(S. 415)

Drawn & Litho. Govt. Photozinco: Office Poona 1892.

CASE No. XV.—BROWN, C. B. GALLOWAY, *aged, in fair condition, and healthy.*

Potass : Bichromate Treatment.

January 30*th*, 1891, 1-30 *P.M.*—Injected ·8 c. c. of blood, containing numerous Surra hæmatozoa—directly into the left Jugular Vein. The inoculated blood was drawn from the right Jugular Vein of Horse No. XI—Temp. P.M. 38·5°C.

31*st.*—Temp. A.M. 37·5° C. No. hæmatozoa observed in the blood. Temp. P.M. 37·7°C.
February 1*st.*—Temp. A.M. 37·8° C., P.M. 38·2° C. No hæmatozoa in the blood.
2*nd.*—Temp. A.M. 38·2°C., P.M. 38·5°C. No do.
3*rd.*—Temp. A.M. 37·3°C., P.M. 37·8°C. No do.
4*th.*—Temp. A.M. 37·5°C., P.M. 39·1°C. No do.
5*th.*—Temp. A.M. 39·°C., P.M. 39·4°C. Numerous do.
6*th.*—Temp. A.M. 38·°C., P.M. 38·3°C. Very numerous do.
7*th.*—Temp. A.M. 38·6°C., P.M. 38·6°C. Do. do.

There is some œdema of all the extremities, especially of the fore-legs. It is decided to try the efficacy of Potass : Bichromate on the hæmatozoon in the blood. Consequently at 12-45 P.M. five grains of the salt dissolved in m.XL of water were injected into the left Jugular Vein.

8*th.*—There is considerable œdema at the seat of yesterday's injection. On this account the condition of the Jugular Vein cannot be precisely determined, but it is pervious to the passage of blood. Temp. A.M. 39·9°C. The hæmatozoa are very numerous in the blood. Temp. P.M. 39·8° C.

9*th.*—Injected 7·5 grains of Potass : Bichromate into the right Jugular Vein. Temp. A.M 39·5° C. Hæmatozoa numerous in the blood. Temp. P.M 39·9°C.

10*th.*—Injected 11 grains of Potass : Bichromate dissolved in distilled water into the right Jugular Vein. The animal immediately after the operation continued to eat and during the day presented no bad symptom. Temp. A.M. 39·5°C. The hæmatozoa are few in the blood and torpid. Temp. P.M. 39·8°C.

11*th.*—Temp. A.M. 39·6°C., P.M. 39·8°C. Hæmatozoa absent.

12*th.*—The œdema is increasing. It now extends to the under-surface of the neck, chest and abdomen. Temp. A.M. 37·7°C. Hæmatozoa few in the blood. Temp. P.M. 39·9° C.

13*th.*—Condition unchanged. Temp. A.M. 38°C. Hæmatozoa few but active in the blood. Temp. P.M. 38·3° C. Potass : Bichromate one drachm, in water one pint by the mouth.

14*th.*—The animal received one drachm of Potass : Bichromate in one pint of water by the mouth. Temp. A.M. 38·7°C. Hæmatozoa numerous in the blood. Temp. P.M. 38·9°C.

15*th.*—The same quantity of the Bichromate was administered in the same way as yesterday's draught. Temp. A.M. 38·8°C. Hæmatozoa numerous in the blood. Temp. P.M. 38·9°C.

16*th.*—The animal appears fairly well, the appetite is good and the evacuations appear normal. 40 grains of Potass : Bichromate administered. Temp. A.M. 39·1°C. Hæmatozoa numerous. Temp. P.M. 39·4°C.

17*th.*—The condition of the animal is unchanged. Temp. A.M. 39·1°C. Hæmatozoa numerous in the blood. Temp. P.M. 39·3°C. Potass : Bichromate sixty grains administered in water.

18*th.*—Condition of animal unchanged. Temp. A.M. 39·1°C. Hæmatozoa are numerous in the blood Administered sixty grains of Potass : Bichromate. Temp. P.M. 39·3° C.

19*th.*—Condition of animal unchanged. Temp. A.M. 39·1°C. Hæmatozoa are few in number and somewhat torpid. Eighty-five grains of Potass : Bichromate given in two doses during the 24 hours. Temp. P.M. 39·4°C.

20*th.*—The animal's appetite continues to be very good and the medicine does not appear to produce any discomfort. Temp. A.M. 38·5°C. Hæmatozoa few in the blood. Forty grains of Potass : Bichromate administered at 10 A.M. and forty grains at 5·30 P.M. Temp. P.M. 38·8°C.

21*st.*—Condition unchanged. Temp. A.M. 38·°C. The hæmatozoa are again numerous in the blood. Forty grains of Potass : Bichromate given at 10 A.M. and one hundred and twenty grains in the evening. Temp. P.M. 38·3° C.

22nd.—The animal's appetite continues very good. Temp. A.M. 40·1°C. Hæmatozoa are absent from the blood. Gave one hundred and twenty grains of Potass: Bichromate at 10 A.M. Temp. 1 P.M. 40·4°C. and at 5·30 P.M. 41·8°C. At six P.M. administered seventy grains of Potass: Bichromate. Temp. 8·30 P.M. 41·7°C.

23rd.—The animal continues to eat well, but drinks very little water. Temp. 6 A.M 39·7°C., at 8·30 A.M. 39·5°C., at 11 A.M. 39·5°C. There are no hæmatozoa in the blood. The medicine was omitted to-day entirely. Temp. P.M. 39·7°C.

24th.—Condition of animal unchanged. Temp. 8 A.M. 37·8°C. Only three hæmatozoa observed in three cover-glass specimens of blood. The animal received one hundred and twenty grains of Potass: Bichromate in the morning and a similar dose in the evening. Temp. 1 P.M. 38·6°C., at 6 P.M. 38·5°C.

25th.—Condition unchanged. Temp. A.M. 37·2°C. The hæmatozoa are again numerous in the blood. Administered one hundred and eighty grains of Bichromate in the morning and a similar dose in the evening. Temp. P.M. 37·6°C.

26th.—Condition unchanged. Temp. A.M. 39·6°C. The hæmatozoa continue to be numerous in the blood. Administered one hundred and eighty grains of Potass: Bichromate during the 24 hours. Temp. P.M. 39·4°C.

27th.—There are three or four petechiæ on the mucous membrane of the nostrils. Temp. A.M. 40·8°C. There are no hæmatozoa in the blood. Administered two doses of Potass: Bichromate, one hundred and eighty grains on each occasion. Temp. P.M. 41·1°C.

28th.—The animal's appetite is good, evacuations appear healthy. Ordered linseed gruel three times a day on account of some blood stained mucus which was ejected on coughing. Temp. A.M. 38°C. There are no hæmatozoa in the blood. Temp. P.M. 38·5°C. Potass: Bichromate 360 grains were given during the day.

March 1st.—From this date the Potass: Bichromate is to be discontinued as it appears to be useless. Temp. A.M. 38·1°C. No hæmatozoa in the blood. Temp. P.M. 38·7°C.

2nd.—No change in the animal's condition. Temp. A.M. 38·4°C. No hæmatozoa in the blood. Temp. P.M. 38·5°C.

3rd.—No change in the animal's condition. Temp. A.M. 38·5°C. Hæmatozoa absent from the blood. Temp. P.M. 39·1°C.

4th.—Condition unchanged. Temp. A.M. 39·5°C. Hæmatozoa numerous in the blood. Temp. P.M. 39·7°C.

5th.—Condition unchanged. Temp. A.M. 39·4°C. The hæmatozoa are numerous in the blood.

6th.—Condition unchanged. There is no diminution of the amount of swelling and œdema of the body and limbs. The appetite remains good and the evacuations are healthy in appearance. Temp. A.M. 39·7°C. The hæmatozoa continue to be numerous in the blood.

7th.—Condition unchanged. Temp. A.M. 39·1°C. The hæmatozoa are numerous in the blood. Temp. P.M. 39·8°C.

8th.—The animal appears somewhat weaker, but there is no falling off in the appetite Temp. A.M. 39·7°C. The hæmatozoa continue to be numerous in the blood. Temp. P.M. 39·8°C.

9th.—Condition of the animal unchanged. Temp. A.M. 39·5° C. The hæmatozoa are numerous. Temp. P.M. 39·7°C.

10th.—The animal is certainly weaker, and the swelling and œdema have increased. Temp. A.M. 39·2°C. The hæmatozoa are still numerous. Temp. P.M. 39·5°C.

11th.—Condition unchanged. Temp. A.M. 39·9°C. The hæmatozoa remain as before numerous in the blood. Temp. P.M. 38·7°C. The animal fell in the stable just before midnight and death took place at 2 A.M. on the 12th.

AUTOPSY at noon, 12th March.

The body is fairly well nourished. The scrotum and sheath together with the undersurface of the abdomen present some swelling and œdema.

On opening the Thorax. There is no fluid in the pleural cavities and there are no adhesions between the visceral and parietal pleuræ.

Lungs.—These organs are of a pale pinky-yellowish tinge and have several blood extravasations dotted over their surfaces, varying in size from a small split pea to that of a two-anna piece. Both apices are the seat of a certain amount of emphysema. On passing the hand over the visceral pleuræ, small gritty excrescences are to be felt over the entire area of both organs. These excrescences vary in size from a mustard seed to a small pin's head, and present an appearance not unlike that presented by grey miliary tubercles. There are also numerous larger bodies which lie in the substance of the tissues $\frac{1}{4}$th to $\frac{3}{4}$th of an inch below the visceral pleuræ, feel very hard and when cut down upon are found to be hard bodies which have undergone caseation and subsequent calcification. On section of the lungs the colour presented by the cut surfaces is a peculiar pinkish-yellow, the divided blood vessels are occluded by yellow coloured clots.

Heart.—The pericardial sac contains several ounces of a light-brown coloured fluid. No hæmatozoa can be discovered in it. The *external* surface of the heart presents numerous dark-purple coloured patches, varying considerably in size: the largest being situated on the anterior surface of the right ventricle involving also the inter-ventricular groove, and about half an inch of the left ventricle nearest to the furrow. There are numerous circumscribed and localized petechiæ dotted over the base of the heart laterally and posteriorly. The right side of the organ is distended by a large mass of yellow clot running through and making patent the communication between the right auricle and ventricle. The wall of the right ventricle is slightly hypertrophied and there are a few ecchymoses beneath the endocardial lining. The valves are healthy. The left auricle and ventricle are distended by similiar clots, and these have maintained inter-communication between the two cavities. There are numerous and extensive extravasations lying beneath the endocardial lining of the ventricle; these for the most part involve the structure of the musculi-papillares, but on section do not appear to dip into the muscular structure of the organ. The valves are healthy.

The *abdominal cavity* contains several pints of a pale-yellow coloured fluid, but the lustre of the peritoneal covering of the intestines is normal. The *Stomach* contained a little semi-digested food. The *cuticular* portion appears to be quite normal and healthy, but a colony of *bots* covers an area of about three inches square. The *villous* portion presents a purplish coloured patch, about two inches from the margin of the cuticular surface, an inch and a half in diameter, and this patch is itself surrounded by small, circular ecchymoses, some distance apart with healthy membrane separating them. The colour is imparted to the above patches, from extravasated blood lying under the mucous membrane of the organ.

Spleen weighs 4 lbs. 7½ ounces. It is very irregular in shape. The base is quadrilateral in form and of considerable thickness. There are no petechiæ on the surface, but there are recent flakes of lymph on the surface of the organ. The tissue on section is firm and healthy looking.

Liver weighs 19 lbs. The right lobe presents a dark-red colour, whilst the surface of the left is opalescent. The whole surface of the gland, especially the left lobe, presents a condition of peri-hepatitis; lying under the capsule are innumerable, round, light coloured spots varying in size from $\frac{1}{16}$th to $\frac{1}{8}$th of an inch. These give a densely mottled appearance to the surface of the organ. *On section* the tissue presents a yellowish-red colour dotted over with white spots which on scraping with a knife are readily enucleated. Many of these bodies are hard and have undergone calcification.

Kidneys are pale in colour. The stellate veins are particularly noticeable at the inferior parts. The capsules strip easily in most parts, but are adherent at several points. The tissue of the organ is a dirty grey in colour dotted over with very minute petechiæ. On section, the only thing to attract attention is the extreme pallor of the cortical and medullary substances.

Small intestines.—There are a few patches of ecchymoses scattered at long distances apart on the surface of the mucous membrane, but no ulceration.

Cæcum and Colon contained fæces, but there are no extravasations noticeable on their mucous surfaces.

Bladder healthy.

The points of interest in this case are:—

(i). That blood containing hæmatozoa was directly injected into the general circulation, and reproduced the disease after an incubative period lasting six days.

(ii). That the symptoms of swelling and œdema of the limbs became apparent on the third day after the hæmatozoon had been discovered in the blood.

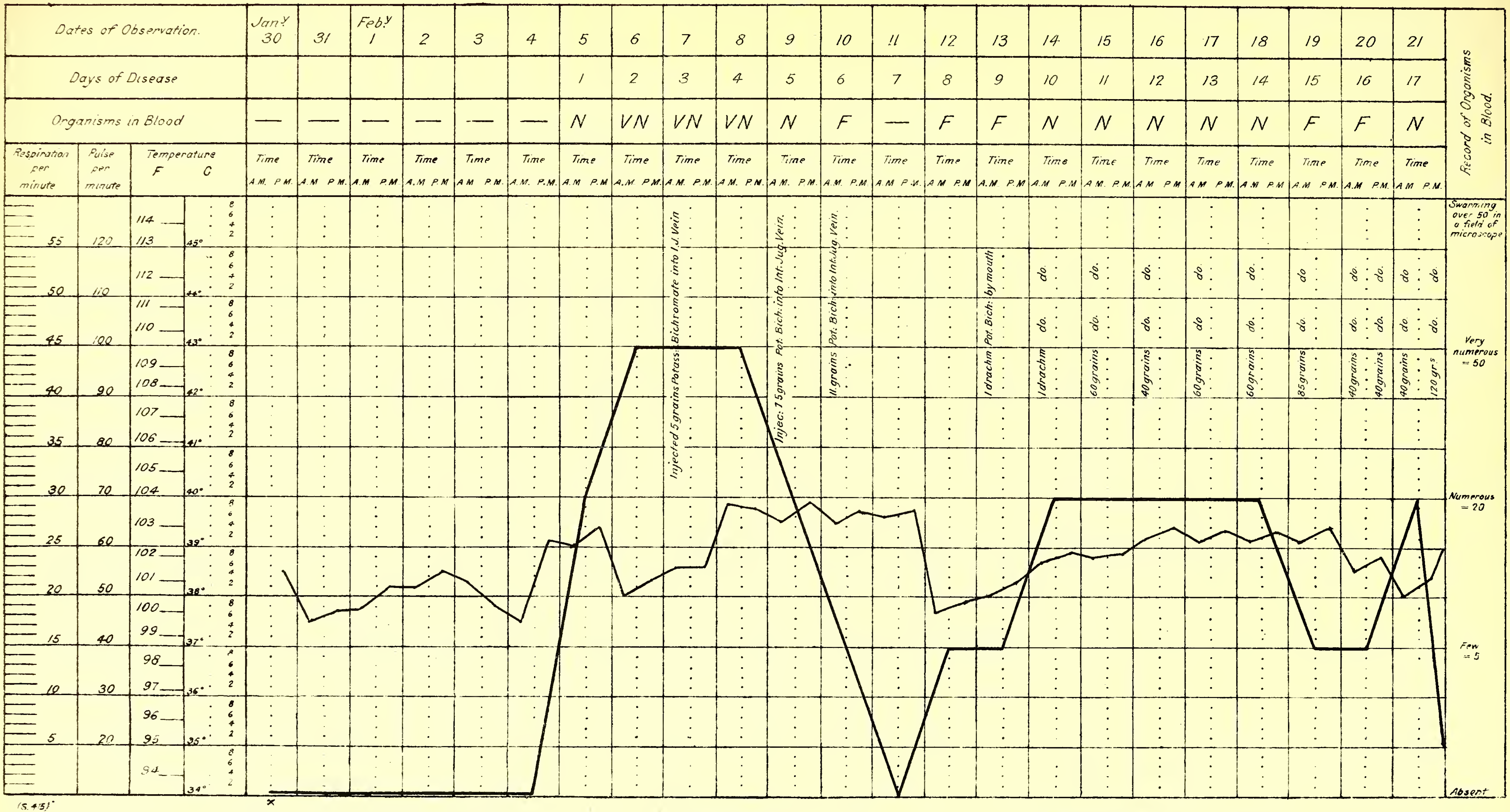
(iii). That doses of 5 grains, 7·5 grains, and 11 grains of Potass: Bichromate injected directly into the general circulation of the horse should have produced no appreciable symptoms, with the exception of the localized œdema at the point of inoculation.

(iv). That after a course of large doses of Potass: Bichromate, which attained to 360 grains in the twenty-four hours and amounted to 2,378·5 grains in all, the animal should have maintained fairly good health, and the hæmatozoa have still continued to be numerous in the blood.

[illegible] Age, Aged. Sex, Male. Colour, Brown.

Country bred Galloway ______ Age, Aged. ___ Sex, Male. ______ Colour, Brown. ______

Disease, "Surra" inoculated. ______ Date of Inoculation, 30th Jany 1891. __ Result, Death ______ Date of Result, 12. 3. 91. ___ Register No. ___ XV. ______



(S. 4 5)°

× 0.8 c.c. of blood containing numerous hæmatozoa was drawn from the right jugular vein of Horse No XI. and directly injected into the left jugular vein of No. XV.

Drawn & Litho: Govt Photozinco: Office Poona 1892.

Hæmatozoon curve ————

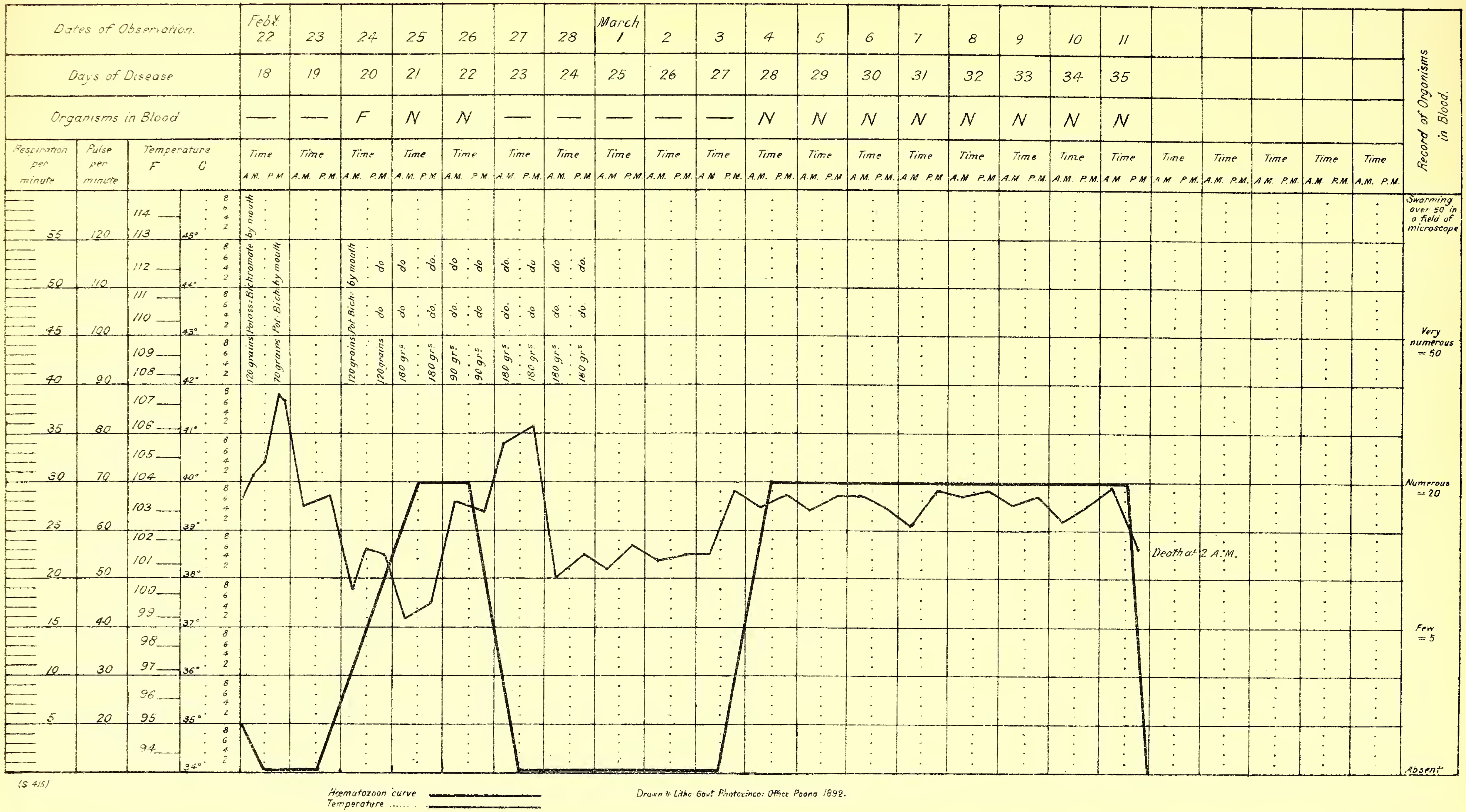
Temperature.........————

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age ________ Sex ________ Colour ________

Disease ________ Date of Attack ________ Result ________ Date of Result ________ Register No. XV ________



(S 415)

Drawn & Litho Govt Photozinco: Office Poona 1892.

APPENDIX IV.

EXPERIMENTAL CASES.

SUBCUTANEOUS INOCULATION WITH ANTE-MORTEM BLOOD.

HORSES V, VIII, VI, XXII, IV, XXX, XXI, XXIX, LXIV,
LIX, LIV, LV, XXIV.

CASE No. V. BAY, COUNTRY-BRED HORSE, *old and somewhat emaciated, but healthy.*

17th November 1890.—Temp. A.M. 36·2°C.

18th.—Temp. A.M. 36·2°C. Inoculated at 10·30 A.M. on the left side of the face with 3 c.c. of blood from the Jugular Vein of horse No. IV. The blood at the time of inoculation was swarming with hæmatozoa. Temp. P.M. 38°C.

19th.—Temp. A.M. 37·5°C. P.M. 37·7°C.

20th.—Temp. A.M. 37·8°C. P.M. 39·2°C.

21st.—Temp. A.M. 37·8°C. P.M. 39·3°C. No hæmatozoa observed in the blood.

22nd.—Temp. A.M. 37·8°C. P.M. 39·6°C. Hæmatozoa few in the blood for the first time this morning. There is a discharge, yellow in colour, exuding from several points on the near hind leg.

23rd.—Temp. A.M. 38·2°C. P.M. 39·3°C. Hæmatozoa very numerous in the blood.

24th.—Temp. A.M. 36·8°C. P.M. 37·2°C. Hæmatozoa very numerous and active in the blood. Horse fell last night and was unable to rise. He has now been placed in slings.

25th.—Death at 3 A.M.

AUTOPSY at 9 A.M.

The body was emaciated. There is a very extensive yellow exudation lying under the surface of the skin of the abdomen, sheath and scrotum.

Both pleural cavities contain a small quantity of an amber-colored fluid.

Right lung.—There is a small circumscribed patch of pneumonia involving the apex and another patch, the size of a walnut lying superficially on the posterior lobe. There is considerable thickening of the pleura caused by the infiltration of a yellow fluid into its meshes on the anterior portion of the organ. On the superior surface of the posterior lobe near the middle there is a patch of extravasated blood lying under the visceral pleura. This patch is made up of 3 or 4 circumscribed extravasations about $\frac{1}{3}$rd of an inch in diameter aggregated together.

Left lung.—Deeply congested and very œdematous throughout its whole structure, but there are no extravasations on the pleura as was the case in the right lung.

Heart.—Pericardial fluid somewhat increased in amount. Heart normal in size. At the base there is the same jelly-like material as was observed under the abdominal muscles. The *right auricle* contains some clots. The *right ventricle* also contains clots. There are no sub-endocardial extravasations of blood. The valves are healthy. The *left auricle* contains a few small clots but there are no ecchymoses on its walls. The cavity of the *left ventricle* is exceedingly contracted, containing only some small blood clots, but the walls are considerably hypertrophied, measuring $2\frac{1}{2}$ inches in thickness.

Stomach.—Slightly contracted and contains a small quantity of semi-fluid ingesta. Externally there are no changes observable. *On section* the *cuticular* portion presents a pale appearance. At the line of demarcation between this portion and the villous portion, the cuticular coat abruptly terminates in a scolloped border, the free edge of which is finely crenated. This free edge is of a bright yellow colour, forming a narrow line, $\frac{1}{12}''$ in diameter but here and there becoming wider and forming yellow patches on the cuticular coat.

The villous portion.—This, for the purpose of description, may be divided into two portions; first the cardiac portion of the organ and secondly the pyloric. The cardiac division commencing abruptly at the free edge of the cuticular coat presents a dark reddish-purple colour and here the mucous membrane lining it has been denuded; in the other parts the mucous coat hangs in shreds presenting an opalescent membrane through which the darker colour beneath is seen, but to a modified extent.

The pyloric portion.—The mucous membrane of this portion is intact but considerably thickened and presents circumscribed patches of a bright red colour and granular in appearance. The summits of the rugæ nearest to the central portion of the stomach are of a deep red colour but the colour of them gradually fades as they approach the pylorus.

The Liver is normal in size but somewhat dark in colour. There are signs of old peri-hepatitis over a small portion of the convex surface.

Spleen.—Normal in size and consistency, but on section very dark in colour.

Kidneys.—No naked eye changes discernible.

Bladder.—Normal except some congestion at the neck of the organ. In the œdematous fluid from the penis a few hæmatozoa were seen, but they were dead.

Remarks.—This was an old horse, in bad condition, inoculated to keep up the supply of material.

The only point of interest in this case is that the animal being old and debilitated rapidly succumbed to the disease.

Transmission of the disease by subcutaneous injection of 3 c.c. of blood containing swarms of hæmatozoa at the time of inoculation.

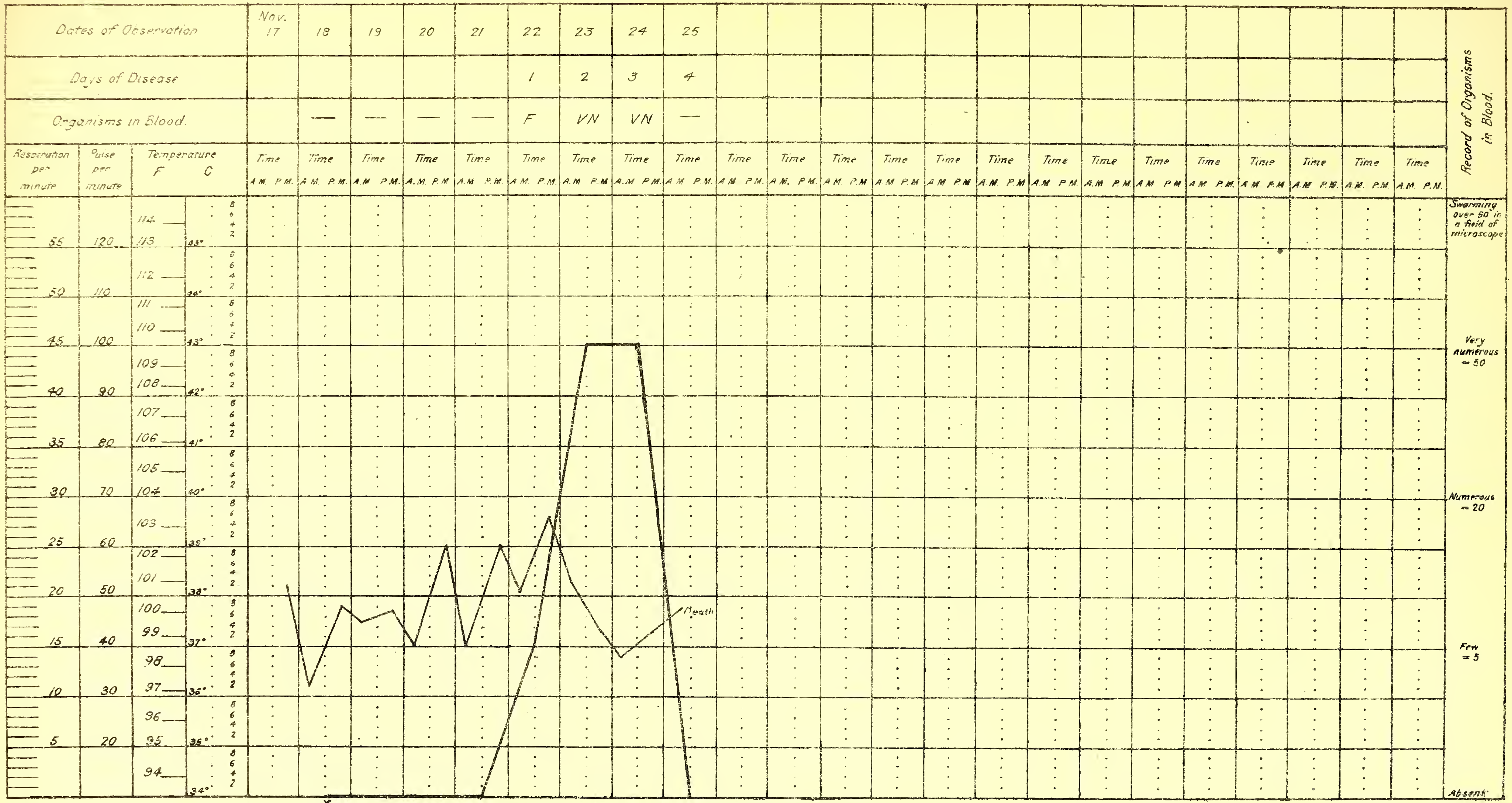
The incubation-period extended over a period of four days.

The period which elapsed between the inoculation of the animal and its death, was seven days.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age, Aged Sex, Gelding Colour, Bay

Disease, Surra Date of Inoculation, Nov. 18 - 1890 Result, Death Date of Result, Nov. 25-90 Register No. 5



Dates of Observation	Nov. 17	18	19	20	21	22	23	24	25
Days of Disease						1	2	3	4
Organisms in Blood		—	—	—	—	F	VN	VN	—

(S. 415)

Hæmatozoon curve ——

Temperature .... ——

x Inoculated Subcutaneously 3·0 cc. of blood drawn from Horse No. IV. Swarming with hæmatozoa.

Drawn & Litho: Govt. Photozinco: Office Poona 1892.

CASE No. VIII. BAY GELDING; *age 10 years.* A good subject and in vigorous health. It has partial luxation of the off fetlock (hind), but this does not cause lameness.

19th December 1890.—Injected subcutaneously, 1 cubic centimetre of blood taken from the Internal Jugular Vein of Case No. VII. The inoculated blood contained very numerous hæmatozoa. The hæmatozoa are absent from the blood. Temp. P.M. 38·2°C.

20th.—There is a small swelling at the seat of inoculation, circular in form and about one inch in diameter. It is not tender to the touch. Temp. A.M. 37·4°C. There are no hæmatozoa in the blood. Temp. P.M. 38·8°C.

21st.—The swelling has increased in size and is now about two inches in diameter. Temp. A.M. 39·5°C. Hæmatozoa are absent from the blood. Temp. P.M. 38·7°C.

22nd.—The swelling at the seat of inoculation has considerably increased in extent and is now 2½″ by 3″. It is tender to the touch and presents a certain amount of tension. Temp. A.M. 38·3°C. On withdrawing a small quantity of blood from the tumour with a Pravaz syringe and needle, several hæmatozoa were observed in two cover-glass preparations of blood from the seat of inoculation. They were not found in the blood of the general circulation. Temp. P.M. 39·5°C.

23rd.—The swelling has not increased in size since yesterday but is still tender on manipulation. Temp. A.M. 39·3°C. There are no hæmatozoa in the blood. Temp. P.M. 40·2°C.

24th.—The swelling has not altered in size, but has certainly lost the tension and some of the tenderness noted above. Temp. A.M. 40°C. There are a few hæmatozoa in the blood. Temp. P.M. 40·2°C.

25th.—Temp. A.M. 39°C. Hæmatozoa very numerous in the blood. Temp. P.M. 40·1°C.

26th.—Temp. A.M. 41·3°C. Hæmatozoa numerous in the blood. Temp. P.M. 41·2°C.

27th.—Temp. A.M. 38·8°C. Hæmatozoa numerous in the blood. Temp. P.M. 41·1°C.

28th.—Temp. A.M. 40°C. No hæmatozoa were observed in the blood. Temp. P.M. 40·1°C.

29th.—Both the hind limbs are swollen and œdematous; but the fore-legs and sheath are not so. Temp. A.M. 39·3°C. Hæmatozoa absent from the blood. Temp. P.M. 39·8°C.

30th.—Injected subcutaneously Iodoform in Æther 3 grains. Temp. A.M. 38·2°C. Hæmatozoa absent from the blood. An Urticarial form of eruption has appeared over the whole surface of the body. Temp. P.M. 38·6°C.

31st.—Injected subcutaneously 4 grains of Iodoform in Æther. Temp. A.M. 38·1°C. Few hæmatozoa observed in the blood. Temp. P.M. 40°C.

January 1891.—

1st.—Injected directly into the left Jugular Vein. 5 grains Iodoform in Æther. Temp. A.M. 38·2°C. There are a few hæmatozoa in the blood. Temp. P.M. 40·7°C.

2nd.—Injected directly into the right Jugular Vein 14 grains Iodoform in Æther. Temp. A.M. 39·5°C. Hæmatozoa numerous in the blood. Temp. P.M. 41·3°C.

3rd.—Injected directly into the right Jugular Vein. 25 grains Iodoform in Æther. Temp. A.M. 38°C. Hæmatozoa few in the blood. Temp. P.M. 39·1°C.

4th.—Temp. A.M. 38·2°C. Hæmatozoa numerous in the blood. As the Iodoform appears to have no action upon the number of hæmatozoa in the blood, it is decided to inject some Mercuric Perchloride. Consequently at 11 A.M. 0·6 gramme of Mercuric Perchloride in Glycerine 10 c.c., Water 6 c.c., were injected directly into the right Jugular Vein.

12·20 P.M. The animal is lying down, has passed fæces, three times of a pultaceous character, and passed urine twice.

1 P.M. Administered 6 beaten up eggs. The horse has defecated twice since 12·30 P.M. About this time, the animal rose from the recumbent position and passed a large quantity of clear colourless urine. Pulse 50; soft in character. The animal occasionally looks round at its side, but does not show signs of colic, although abdominal uneasiness is evidenced by the rapidity with which the fæces are passed 5 times in 2 hours. The animal is to receive 6 eggs every 4 hours. Diet—linseed, branmashes, and milk. Blood examined. Hæmatozoa are numerous and active.

3 P.M.—The animal passed a quantity of pale, straw-coloured urine, containing a slight trace of albumen, and some phosphates. Temp. 5 P.M. 41·6°C. Hæmatozoa are numerous.

5th.—The patient is recovering from the effects of the very large dose of the Mercuric Perchloride. The large drain from the intestinal canal and kidneys has not sufficed to remove the œdema from the hind limbs, although it is less in quantity. Temp. A.M. 38·2°C. Hæmatozoa few but active in the blood. Temp. P.M. 38·9°C.

6th.—Appetite poor. During the twenty-four hours until this morning the animal had not passed any fæces. The dung balls show in places a trace of blood. Temp. A.M. 38·5°C. Hæmatozoa few in the blood. Temp. P.M. 38·4°C.

7th.—The animal appears much brighter this morning and is better. The appetite is good. No fæces have been passed during the last twenty-four hours. Temp. A.M. 38·3°C. Hæmatozoa few in the blood. Temp. P.M. 40·1°C.

8th.—The animal had an attack of colic during the night; but it was relieved by opium. Has passed no fæces. Appetite poor. Temp. A.M. 38·2°C. No hæmatozoa in the blood. Temp. P.M. 39·5°C. The buccal membrane is dry. The animal is therefore to get at once 6 eggs in a quart of linseed gruel; and this is to be repeated every four hours.

9th.—The animal is salivated this morning. The appetite has quite failed. The throat is sore as evidenced by frequent deglutition. No fæces have been passed. The eggs and linseed are to be continued every 4 hours. Temp. A.M. 37·2°C. Numerous hæmatozoa were found in the blood. Temp. P.M. 39·4°C.

10th.—The animal has passed practically no fæces since 6th instant, and absolutely none since the 7th. The appetite is poor, but the animal looks brighter. Temp. A.M. 38·5°C. Hæmatozoa numerous in the blood. Temp. P.M. 37°C.

11th.—Death took place at 12 A.M.

AUTOPSY at 9·30 A.M.—There is some fluid in the peritoneal cavity.

Lungs.—A small quantity of bright-yellow fluid is present in the pleural cavities. The lungs are large and occupy the whole of the pleural cavities. The upper portion of the left lung is adherent to the costal pleura anteriorly over a space of about six to eight inches.

Right lung.—Very dark in colour. There is nothing particular noticeable, except the presence of 3 small spots, yellow in colour, which are hard and irregular shaped concretions. On section, the lung substance is very dark in colour, and contains some blood. On pressure a quantity of fluid containing air exudes from the cut surfaces.

Left lung is in a similar condition to the right; and there is a large concretion on the upper and superior surface of the lower lobe.

Heart.—The pericardium contains 16 ounces of a dark brown serous fluid; but the inner surface of the membrane is free from ecchymoses. The right side of the heart contains black clots with a small quantity of blood-stained serum. The valves are healthy. The left ventricular walls are hypertrophied and contain a large decolourised clot adherent to the valves and musculi-papillares. Valves healthy. There are several large extravasations of blood, varying in size, the largest being 1½″ × ¾″, lying beneath the endocardium. These are present to a limited extent around the upper part of the right ventricle, but are much more marked and the extravasated blood is found to penetrate to a greater depth in the upper portion of the left ventricle.

Stomach.—Large and distended with semi-digested food. *On section,* the *cuticular* portion is extremely white in colour. The *villous* portion presents some blackening of the lining membrane, probably *post-mortem,* due to the generation of Sulphuretted Hydrogen.

Spleen.—Is normal in size and presents some slight mottling over the surface; on section, the tissue is firm and normal in colour. In the hilum within the folds of the gastro-splenic omentum, there are two large glands, one the size of a fowl's egg, and the other that of a walnut.

Liver.—Much increased in size, weighing 17½lbs., is chocolate brown in colour. There are no adhesions to the diaphragm; but Glisson's capsule presents some old signs of inflammation. On the postero-inferior surface of the right lobe, there are several circumscribed patches of a pearly-white colour, where the capsule has become somewhat thickened. The anterior convex surface of the liver presents a marked pathological change. This extensive surface is dotted over with round circumscribed elevated nodules, some yellow in colour, others white, singly or aggregated together, and varying in size from a pin's head to a third of an inch in diameter. Some of these aggregations are raised above the surface to the extent of a quarter of an inch. Localised scars are present on both surfaces of the liver, giving a puckered appearance to it. *On section,* the same circumscribed nodules are noticed in all parts of the gland tissue. These nodules can be readily enucleated from the tissue of the organ, leaving behind them a well marked tough pearly membrane of appreciable thickness surrounding the cavity occupied by the tumour. These lumps are made up of a hard calcareous material forming the external shell, whilst the interior is occupied by an inspisated putty-like material of a light yellow-ochre colour.

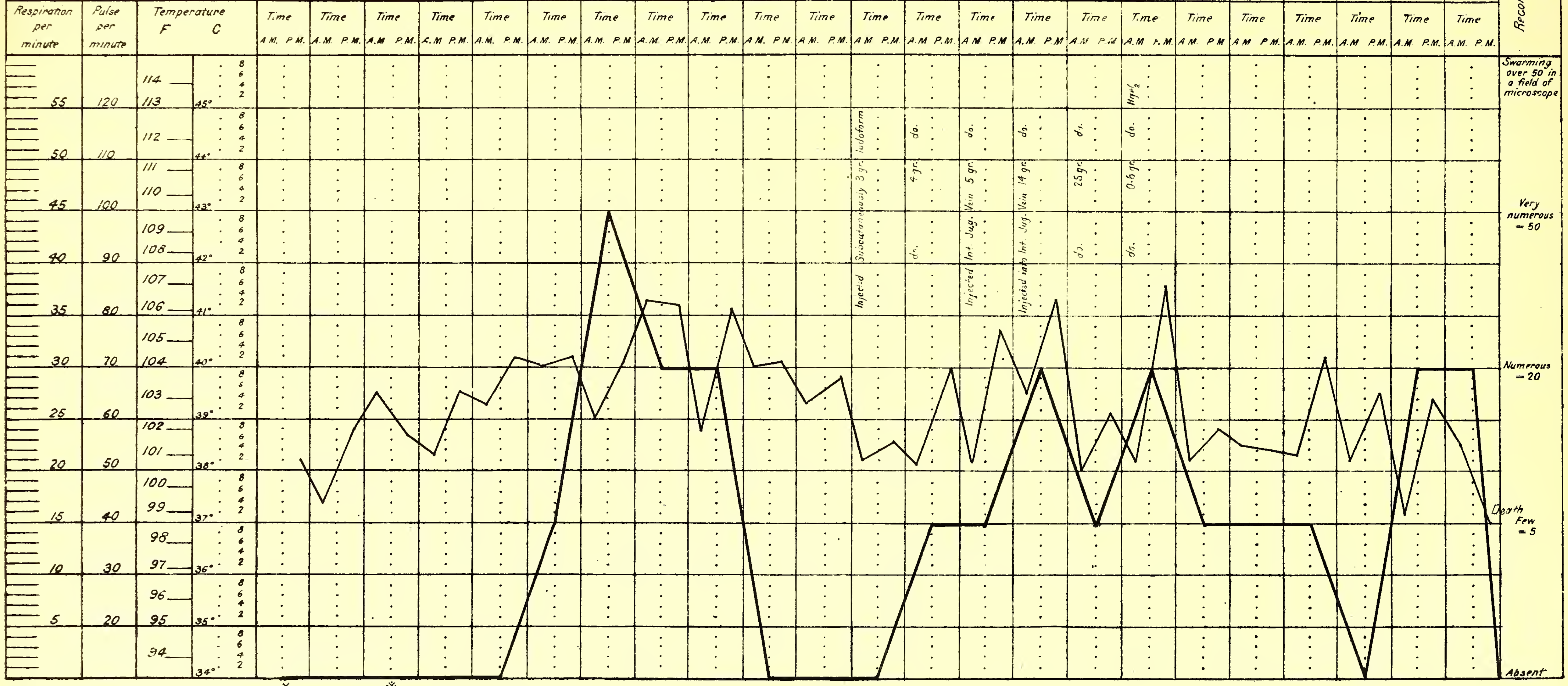
Kidneys.—Are pale. There are no petechiæ observable, and they appear healthy.

Remarks.—This was a strong, healthy horse, and he was inoculated with blood containing the hæmatozoa, on the 19th December. The hæmatozoa were observed in blood taken from the seat of inoculation on the 22nd, although they were not seen in the general circulation until the 24th instant, when they were few in number. As the horse was a strong

Age, Aged Sex, Gelding Colour, Bay

Disease, 'Surra' inoculated Date of Inoculation, 19. Dec. 1890 Result, Death Date of Result 10·1·90 Register No. VIII

Dates of Observation.	Dec. 19	20	21	22	23	24	25	26	27	28	29	30	31	Jan. 1	2	3	4	5	6	7	8	9	10
Days of Disease						1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Organisms in Blood.	—	—	—	—	—	F	VN	N	N	—	—	—	F	F	N	F	N	F	F	F	—	N	N



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Hæmatozoon curve
Temperature ……

Drawn & Litho: Govt. Photozinco· Office Poona 1892.

※ Dec. 21st. Hæmatozoa found in the fluid removed from the swelling at the seat of inoculation.

× Inoculated Subcutaneously 1·0 cc. of blood drawn from the Internal Jugular Vein of Horse No. VII.

one, it was decided to try the effect of Iodoform and Æther. Accordingly on the 30th instant, the hæmatozoa being absent, three grains of Iodoform in Æther were injected subcutaneously, and again on the 31st, 4 grains of Iodoform in Æther. On the 1st January, 5 grains were injected directly into the Jugular Vein. On the 2nd, 14 grains, and on the 3rd 25 grains. On the 4th, the Iodoform and Æther having had no effect upon the hæmatozoon in the blood, 0·6 gramme of Mercuric Perchloride was directly injected into the general circulation. The action of the medicine had a marked effect upon the animal; but the hæmatozoa, after being few in the blood for 3 days and absent during 24 hours, again became numerous, and remained so until the animal's death. The animal did not rally from the effect of the medicine; but the hæmatozoa were apparently unaffected by it. Death occurred on the 10th January. The points of interest in this case are:—

(i). The presence of the hæmatozoon at the seat of inoculation three days after inoculation and two days before its appearance in the general circulation.

(ii). The fact that Iodoform given in sufficiently large doses by intra-venous injection to have a serious effect on the animal's health, had no appreciable effect on the hæmatozoa.

(iii). The same may be said concerning the Mercuric Perchloride given in a large dose.

CASE No. VI.—GREY PERSIAN HORSE, *aged, but in very fair condition and its general health appears good.*

21st. November 1890.—Temp. A.M. 38·8°C. P.M. 38·2°C.

22nd.—10 A.M. The animal was subcutaneously inoculated with 1 c.c. of blood taken from the internal Jugular Vein of Horse No. IV. The injected blood contained very numerous hæmatozoa. Temp. A.M. 37·6°C., P.M. 39·9°C.

23rd.—No change in the animal's condition. Temp. A.M. 37·5°C. No hæmatozoa in the blood. Temp. P.M. 37·6°C.

24th.—There is a slight swelling, the size of a rupee,at the point of inoculation. Temp. A.M. 37·5°C. There are no hæmatozoa in he blood. Temp. P.M. 37·7°C.

25th.—The animal appears to be in good health, appetite good and evacuations normal. The swelling at the seat of inoculation has increased in size and is now tense, and is tender on manipulation. Temp. A.M. 37·4°C. There are no hæmatozoa in the blood. Temp. P.M.37·8°C.

26th.—The condition of the animal is unchanged, but the manifestations at the point of inoculation have become more severe. Temp. A.M. 37·5°C. There are no hæmatozoa in the blood. Temp. P.M. 37·9°C.

27th.—There are a few small petechiæ on the conjunctival membranes, red in colour, the tension of the tumor at the seat of inoculation is distinctly less than yesterday, but the animal immediately shows some signs of uneasiness if the swelling is manipulated. Temp. A.M. 37·9°C. There are a few hæmatozoa for the first time this morning. Temp. P.M. 37·9°C.

28th.—The limbs are somewhat swollen and œdematous and there is fluid in the sheath of the flexor-tendons of the near fore-leg. Temp. A.M. 38·5°C. The hæmatozoa are numerous in the blood. Temp. P.M. 39·4°C.

29th.—Condition unchanged. Temp. A.M. 39·9°C. The hæmatozoa are absent from the blood. Temp. P.M. 40·1°C.

30th.—The animal is dull, and there are numerous petechiæ on the conjunctival membranes. The appetite remains good, and the evacuations are normal. The swelling at the point of inoculation is very much reduced in size. Temp. A.M. 40°C. The hæmatozoa are numerous in the blood. Temp. P.M. 40·6°C.

1*st December.*—Condition unchanged. Temp. A.M. 39°C. The hæmatozoa are numerous. Temp. P.M. 42·2°C.

2*nd.*—The condition of the animal is the same. Temp. A.M. 39·4°C. There are no hæmatozoa in the blood. Temp. P.M. 38·4°C.

3*rd.*—The œdema of the limbs, scrotum and sheath has increased. The gait has become somewhat unsteady, but the animal feeds and rests well. Temp. A.M. 37·7° C. It was now determined to try the efficacy of Mercuric Perchloride upon the hæmatozoa, and for this purpose the following solution was prepared :—

R.	Hydrarg : Perchlor,	x grammes.
	Ammon : Chlor,	x ,,
	Glycerine	xxx cc
	Aqua distill:	lxx cc.

This solution contains 1 decigramme of Mercuric Perchloride in 1 c.c. Injected ·13 gramme of Mercuric Perchloride subcutaneously at 11 A.M. Temp. A.M. 37·7°C. There are no hæmatozoa in the blood. Temp. P.M. 37·3°C.

4*th.*—The condition of the animal is unaltered, the appetite is good and the evacuations normal. Temp. A.M. 37·2°C. Injected ·30 grammes of Mercuric Perchloride subcutaneously. The hæmatozoa are absent from the blood. Temp. P.M. 38·6°C.

5*th.*—Condition of the animal is unaltered. Temp. A.M. 38 °C. The hæmatozoa are few in the blood, and appear somewhat torpid in their movements. Injected ·3 gramme of Mercuric Perchloride. Temp. P. M. 38·8° C.

6*th.*—The condition of the animal is unaltered. Temp. A.M. 38·3°C. The hæmatozoa are numerous and active in the blood. Injected ·45 gramme of Mercuric Perchloride subcutaneously. Temp. P.M. 39·8° C.

7*th.*—The animal has not lost condition since the inoculations were commenced. The œdema appears to have become less in amount, and the weakness of gait has to some extent disappeared since the exhibition of the Mercuric Perchloride. Temp. A.M. 41°C. The hæmatozoa are numerous in the blood. Injected ·7 gramme of Mercuric Perchloride. Temp. P.M. 40·2°C.

8th.—The condition of the animal is the same as yesterday with this exception, that there is an Urticarial form of eruption covering the body, but not well marked. Temp. A.M. 37·8°C. The hæmatozoa are few and torpid in the blood. Injected ·7 gramme of Mercuric Perchloride subcutaneously. Temp. A.M. 38·° C.

9th.—The eruption faded last evening and finally disappeared during the night. Temp. A.M. 38·3° C. The hæmatozoa are numerous in the blood. As up to the present 2·6 grammes or 39 grains of Mercuric Perchloride have been given subcutaneously without any apparent action upon the hæmatozoa, it was therefore decided to make use of the following solution in the further treatment of the case:—

R. Iodine 1·5 grammes.
Potass: Iodidi 7·5 grammes.
Aquam ad 100· cc

Injected eight cubic centimetres of the above solution into the trachea by means of a Pravaz syringe, passing the needle between the cartilaginous rings. Temp. P.M. 40·1° C.

10th.—Condition of the animal is unchanged. Temp. A.M. 40·2°C. The hæmatozoa are numerous in the blood. Injected 8·c.c. of the Iodine solution. Temp. P.M. 40·3° C.

11th.—Condition of the animal is unchanged, and the appetite is good. Temp. A.M. 40·2° C. The hæmatozoa are numerous in the blood. Injected 16 c. c. of the Iodine solution into the trachea. Temp. P.M. 40·1° C.

12th.—The animal's appetite is not so good and he now refuses to eat gram, although he takes hay and green grass. Hæmatozoa are few in the blood and torpid in their movements. Temp. A.M. 39·1° C. Injected 16c c. of the Iodine solution into the trachea; the animal is to receive four seers of milk. Temp. P.M. 40° C.

13th.—The condition of the animal is unchanged. Temp. A.M. 38·6° C. The hæmatozoa are absent from the blood. Injected 8c. c. of the Iodine solution into the trachea. Gave the animal four seers of milk to drink. Temp. P.M. 38·9°C.

14th.—Condition of the animal unaltered. Temp. A.M. 38·6° C. The hæmatozoa are few in the blood. Injected 16 c. c. of the Iodine solution into the trachea. Temp. P.M. 39·2° C.

15th.—The animal has a slight cough, caused by the irritation of the Iodine solution and a slight catarrh of both nostrils. The appetite is poor. Temp. A.M. 39·2° C. The hæmatozoa are numerous in the blood. Injected 16 c. c. of Iodine solution into the trachea. Gave the animal four seers of milk to drink. Temp. P.M. 40·2° C.

16th.—Condition unchanged. Temp. A.M. 39·8° C. Hæmatozoa few. Gave the animal four seers of milk. Injected 24 c. c. of Iodine solution into the trachea. Temp. P.M. 40·1° C.

17th.—Condition unchanged. Temp. A.M. 39·8° C. Hæmatozoa few. Gave the animal four seers of milk. Injected 24 c. c. of Iodine solution. Temp. P.M. 41° C.

18th.—There is considerable swelling and œdema at the seat of the injections of Iodine and for some distance round. The sheath is also more œdematous than it has been previously. Temp. A.M. 40·4° C. The hæmatozoa are few in number in the blood. Discontinued the tracheal injections and gave 10 c. c. subcutaneously in the right scapular region. Temp. P.M. 40·4° C.

19th.—Condition unchanged. Temp. A.M. 40·2° C. Hæmatozoa few. Gave four seers of milk. No injection of Iodine solution was given. Temp. P.M. 40·5° C.

20th.—Condition of animal is unchanged. Temp. A.M. 39·2°C. Hæmatozoa are few in the blood, but active in their movements. The injections of the Iodine solution have been discontinued, as it appears to have no action on the hæmatozoa. Gave the animal two seers of milk. Temp. P.M. 39·6°C.

21st.—Condition of the animal is unchanged. Temp. A.M. 39°C. There are no hæmatozoa in the blood. Temp. P.M. 39·4°C.

22nd.—Condition unchanged. Temp. A.M. 39·6°C. Hæmatozoa few. Temp. P.M. 40·4°C.

23rd.—Condition unchanged. Temp. A.M. 40·8°C. Hæmatozoa numerous. Temp. P.M. 40·3°C.

24th.—Condition unchanged. Temp. A.M. 39·5°C· Hæmatozoa numerous. Temp. P.M. 40·1°C.

25th.—Condition unchanged. Temp. A.M. 39·6°C. Hæmatozoa numerous. Temp. P.M. 39·5°C.

26th.—The animal is the same, the appetite is capricious. There is some swelling and œdema of the under-surface of the abdomen in front of the sheath. There is no diminution of the œdema in front and on the sides of the trachea. Temp. A.M. 41·4°C. The hæmatozoa are numerous in the blood. Temp. P.M. 40·3°C.

27th.—Condition unchanged. Temp. A.M. 41·1°C. Hæmatozoa numerous. Temp. P.M. 40·1°C.

28th.—Condition unchanged. Temp. A.M. 39·6°C. Hæmatozoa numerous. Temp. P.M. 40·1°C.

29th.—The œdema and swelling at the seat of the injections is subsiding somewhat, but there is considerable œdema of the sheath and still more of the penis which is somewhat protruding. The weakness in gait is very noticeable and is particularly marked in the hind limbs. Temp. A.M. 39·7°C. Hæmatozoa numerous in the blood. Temp. P.M. 40·1°C.

30th.—Condition unchanged. Temp. A.M. 39·4°C. Hæmatozoa absent from the blood. Temp. P.M. 40°C.

31st.—Condition unchanged. Temp. A.M. 39·8°C. Hæmatozoa absent from the blood. Temp. P.M. 40·3°C.

1st January 1891.—Condition unchanged. Temp. A.M. 39·3°C. Hæmatozoa absent from the blood. Temp. P.M. 39·8°C.

2nd—Condition unchanged. Temp. A.M. 38·8°C. Hæmatozoa absent from the blood. Temp. P.M. 39·5°C.

3rd.—Condition unchanged. Temp. A.M. 38·9°C. Hæmatozoa absent from the blood. Temp. P.M. 40·2°C. The animal persistently stands, on account of the inability to rise from the recumbent position without assistance. There is a certain amount of swelling still remaining at the seat of the Iodine injections, which now appears to be of a semi-solid nature.

4th.—Condition unchanged. Temp. A.M 38·8°C. Hæmatozoa are absent from the blood. Temp. P.M. 39·9°C.

5th.—Condition unchanged. Temp. A.M. 38·5°C. The hæmatozoa are few in the blood and absent from the œdematous material in the neck. Temp. P.M. 38·7°C.

6th.—Condition unchanged. Temp. A.M. 38·5°C. The hæmatozoa are few in the blood. Temp. P.M. 38·8°C.

7th.—The animal is weaker to-day and hardly moves a muscle of its body. Temp. A.M. 37·7°C. The hæmatozoa are numerous and torpid in the blood. Inoculated two field rats (Nesokia providens), two pigeons and two fowls, each with 0·2c.c. of blood (in which numerous hæmatozoa were present) from the Jugular Vein of this animal. Temp. P.M. 37·9°C.

8th.—Condition unchanged. Temp. A.M. 37·6°C. Hæmatozoa numerous in the blood. Temp. P.M. 37·6°C.

9th.—Condition unchanged. Temp. A.M. 37·7°C. Hæmatozoa numerous in the blood. Temp. P.M. 37·6°C. The animal lay down at 7 P.M. and was unable to rise.

10th.—The animal is much weaker and will only live a few hours. Temp. A.M. 36·7°C. Death at 10·30 A.M.

AUTOPSY at 11 A.M.

The body is somewhat emaciated. There is swelling and œdema of the under-surface of the abdomen, and the extremities are also swollen and œdematous.

Trachea.—At the seat of the Iodine injections, there is a swelling commencing from the cricoid cartilage and involving the upper cartilaginous rings of the trachea, extending from the free edge, on the right side round the point of the tube to the free margin on the left side. *On section* this swelling is found to be the seat of an abscess, the walls are several inches thick and formed of alternate layers of the jelly-like material and fibrous tissue.

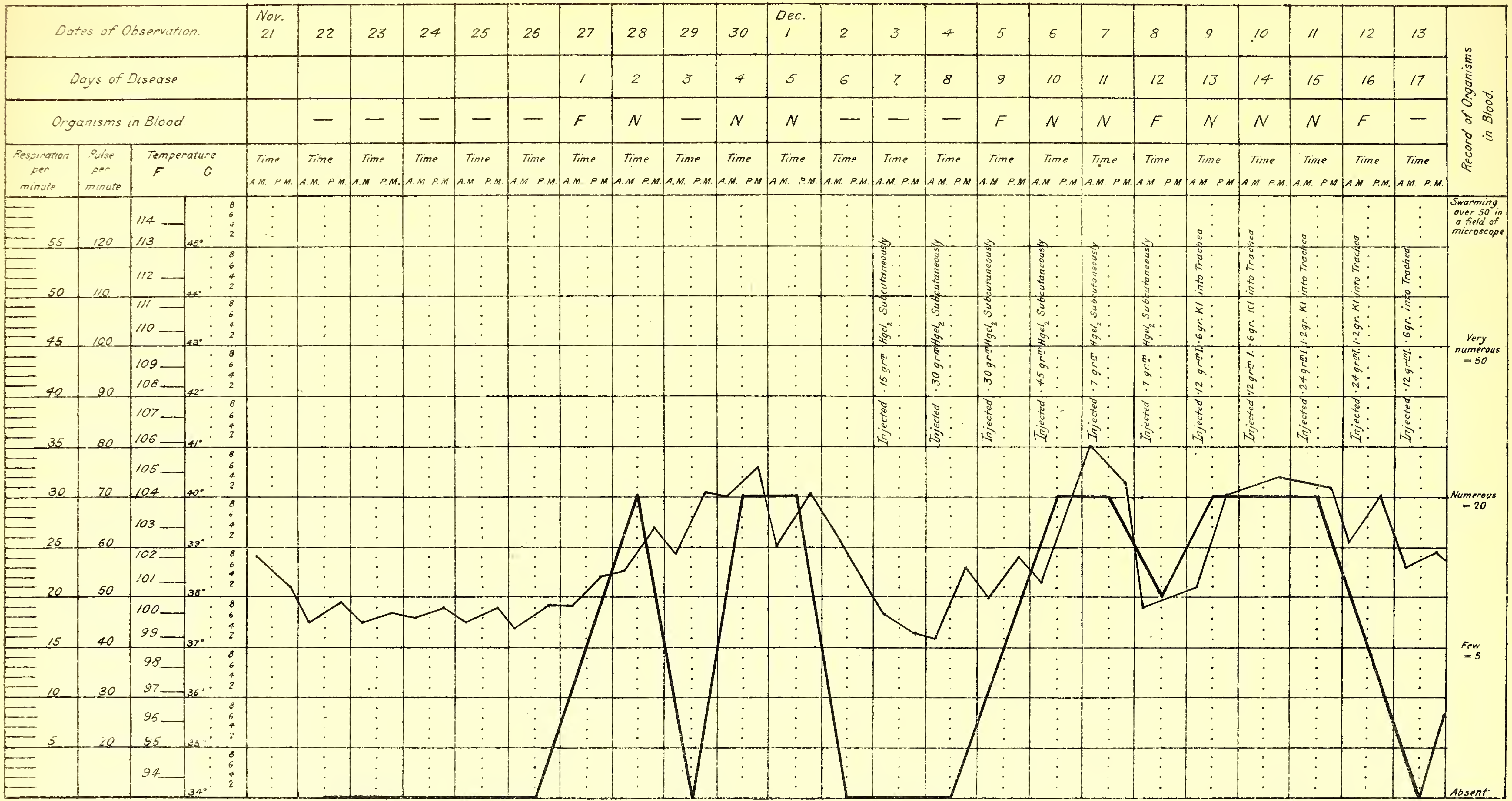
On opening the thorax, the *lungs* present a pale pink colour, the apices and the free borders are the seat of well marked emphysema. The superior and inferior surfaces are dotted over with extravasations, varying in size and colour. *On section* the lung tissue presents a dark colour, and on pressure a muco-purulent fluid exudes from the cut-ends of the bronchial tubes.

Heart.—Externally presents numerous minute petechiæ and several larger extravasations the size of a two-anna piece, one at the base of the heart, the other in the anterior furrow, lying to the right of the coronary vessels. *On section* these extravasations are found to lie underneath the visceral pericardium, but do not appear to invade the muscular structure of the organ.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Persian Horse — Age, Aged — Sex, Entire — Colour, Grey

Disease, Surra — Date of Inoculation, 22. Nov. 1890 — Result, Death — Date of Result, Jan. 10. 91. Register No. VI



Dates of Observation	Days of Disease	Organisms in Blood	
Nov. 21			
22		—	
23		—	
24		—	
25		—	
26		—	
27	1	F	
28	2	N	
29	3	—	
30	4	N	
Dec. 1	5	N	
2	6	—	
3	7	—	Injected ·15 grm $HgCl_2$ Subcutaneously
4	8	—	Injected ·30 grm $HgCl_2$ Subcutaneously
5	9	F	Injected ·30 grm $HgCl_2$ Subcutaneously
6	10	N	Injected ·45 grm $HgCl_2$ Subcutaneously
7	11	N	Injected ·7 grm $HgCl_2$ Subcutaneously
8	12	F	Injected ·7 grm $HgCl_2$ Subcutaneously
9	13	N	Injected ·12 grm I. ·6gr. KI into Trachea
10	14	N	Injected ·12 grm I. ·6gr. KI into Trachea
11	15	N	Injected ·24 grm I. 1·2gr. KI into Trachea
12	16	F	Injected ·24 grm I. 1·2gr. KI into Trachea
13	17	—	Injected ·12 grm I. ·6gr. into Trachea

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Hæmatozoon curve
Temperature .....

Drawn & Litho: Govt. Photozinco: Office Poona 1892.

x Inoculated Subcutaneously with 1·0 cc. of blood taken from the Internal Jugular Vein of Horse No. IV containing very numerous hæmatozoa.

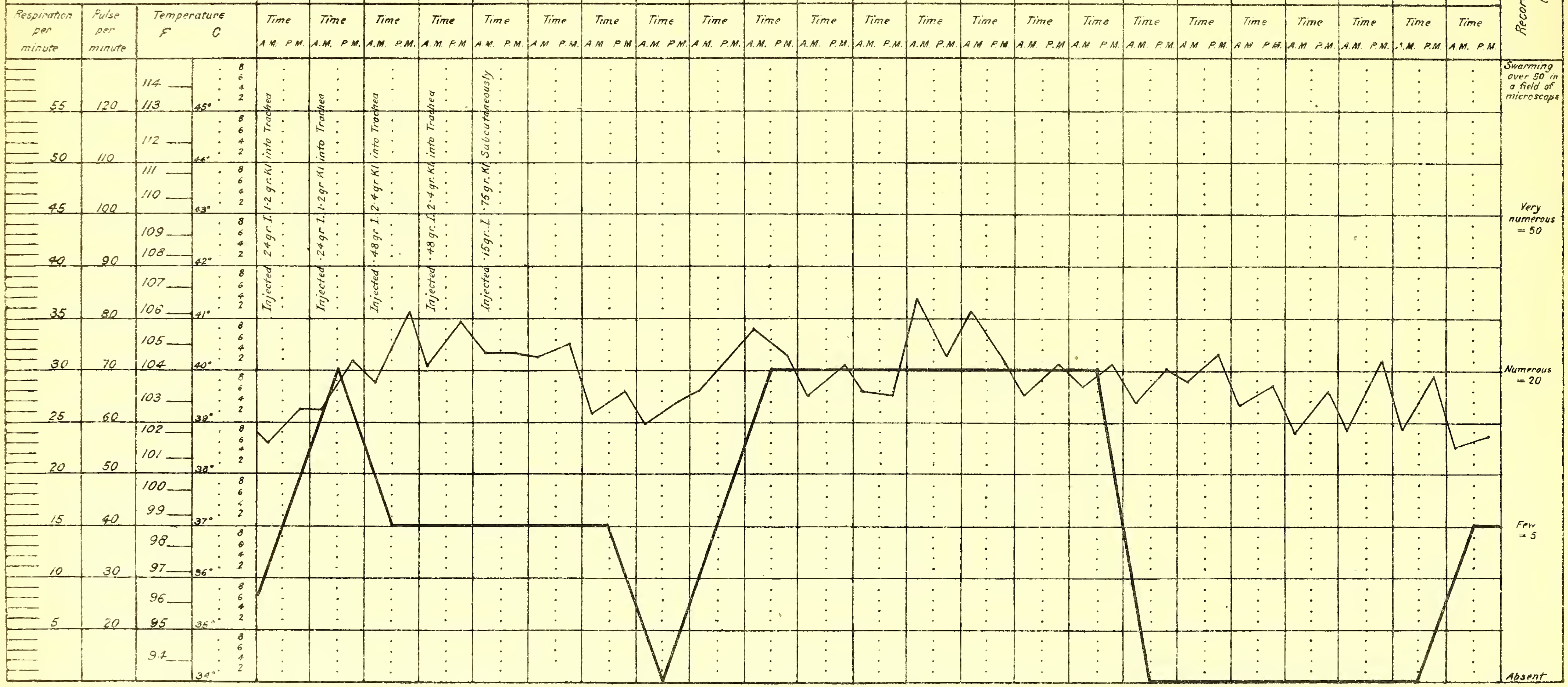
[illegible] TEMPERATURE, PULSE AND RESPIRATION.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age, Aged — Sex, Entire — Colour, Grey

Disease, Surra — Date of Inoculation, 22. Nov. 1890 — Result, Death — Date of Result, Jan. 10. 91. — Register No. VI

Dates of Observation.	Dec. 14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Jan 1	2	3	4	5
Days of Disease	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Organisms in Blood	F	N	F	F	F	F	F	—	F	N	N	N	N	N	N	N	—	—	—	—	—	—	F



(S. 415).

Hæmatozoon curve
Temperature ......

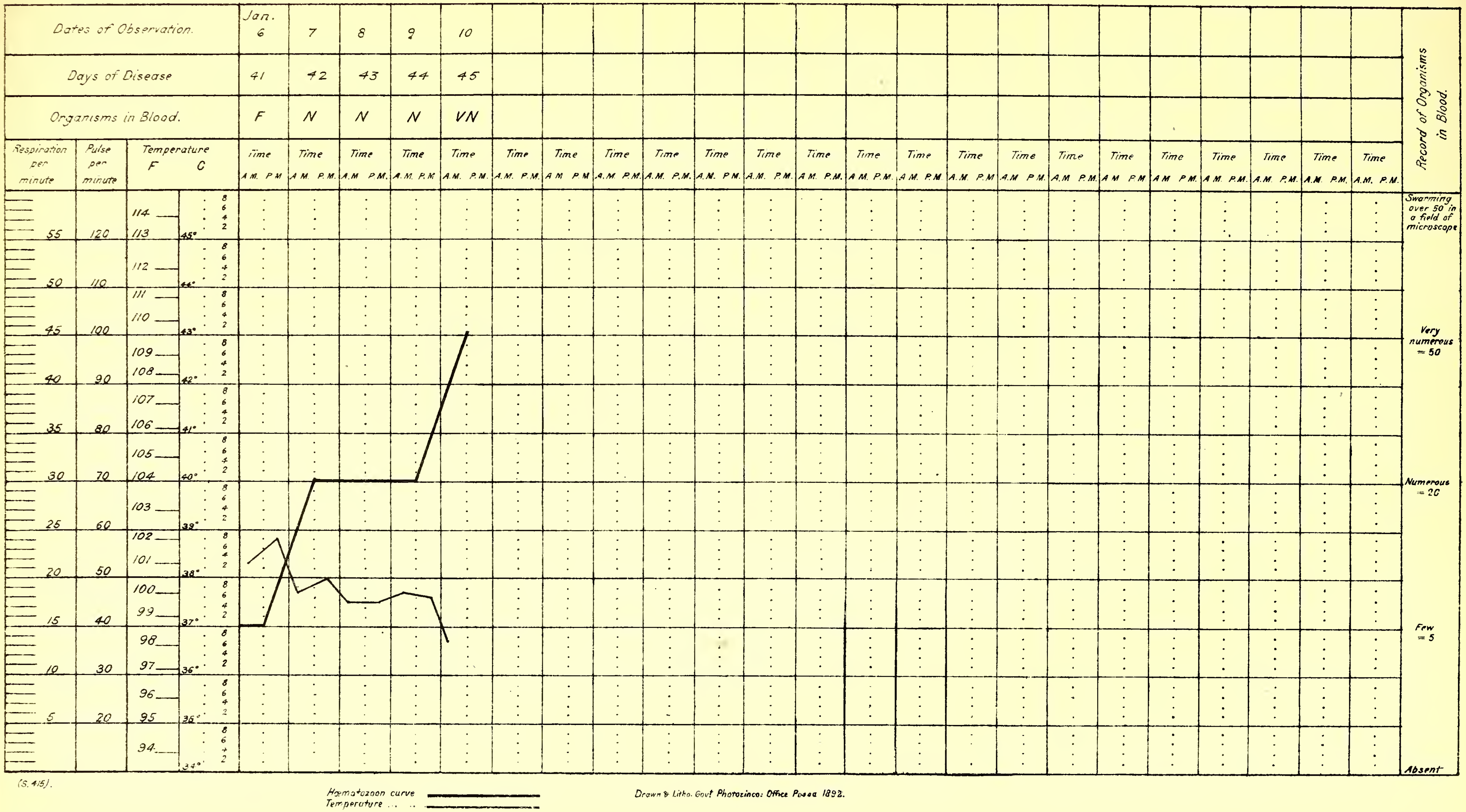
Drawn & Litho: Govt Photozinco: Office Poona 1892.

Age, Aged. Sex, Entire. Colour, Grey

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age, Aged Sex, Entire Colour, Grey

Disease, Surra Date of Inoculation, 22. Nov. 1890 Result, Death Date of Result, Jan. 10. 91. Register No. VI



(S. 415).

Drawn & Litho. Govt Photozinco: Office Poona 1892.

The *right auricle* and *ventricle* contain dark coloured clots, but there are no sub-endocardial extravasations. The *left auricle* is empty, and the *left ventricle* is contracted, and in these cavities also the extravasations are absent. The valves appear normal.

Spleen is large, the surface is studded over with raised petechiæ, which present a dark brick red colour. On the superior border there is some lymph, the result of recent inflammation.

Kidneys. Right.—The capsule is stripped with difficulty, and reveals numerous small round red coloured spots, which are dotted over the whole cortical portion of the organ. The organ is otherwise pale, and on section, the tissues appear somewhat friable, but the petechiæ observed on the surface are not found to dip into the structure of the organ.

Left presents exactly the same conditions.

Liver, large, the seat of old perihepatitis, especially the surface of the left lobe. *On section* the tissues are dark in colour, friable and are easily ruptured. The whole surface of the organ presents a dotted appearance due to the presence of small circumscribed yellow coloured bodies, hard and gritty to the touch, many of which lie immediately under Glisson's capsule, whilst others are observed in the substance of the gland *on section.*

Stomach.—*On section* the organ is empty. On the surface of the mucous membrane covering the greater curvature, there are several small extravasations of blood, which appear to be lying almost on the surface of the membrane. The m. m. at the pyloric orifice of the stomach is thickened, and there are several extravasations on the free surface of the mucous membrane, as well as underneath it.

Intestines.—There are a few petechiæ dotted over the surface of the small intestine, but they are circumscribed and lie far apart. There are no ulcers and no parasites.

Large intestine presents no change.

The points of interest in this case are :—

(i). The successful transmission of the disease by the subcutaneous injection of 1 c.c. of blood which contained very numerous hæmatozoa at the time of inoculation.

(ii). The period which elapsed between the inoculation and the appearance of the hæmatozoon in the blood, was five days.

(iii). That the exhibition of Mercuric Perchloride subcutaneously had a disastrous effect on the animal and very little on the hæmatozoon.

(iv). The presence of an Urticarial form of eruption, covering the neck and body generally, but not very well marked; on the tenth day following the appearance of the hæmatozoon in the blood and the sixteenth from the time of inoculation.

(v). The injection of a solution of Iodine and Iodide of Potassium had to be discontinued as it appeared to have no action on the hæmatozoon and produced a serious effect on the animal.

(vi). The period between the inoculation and the death of the animal was 49 days.

(vii). The pathological lesions found at the *Post-mortem* examination, were of a slight nature.

CASE No. XXII.—BROWN, COUNTRY-BRED PONY, *aged, in fair condition, and healthy.*

29th May 1891.—Inoculated subcutaneously over the Right shoulder with 1 c.c. of blood taken from the Jugular Vein of horse No. XXI, at 10 A.M. The inoculated blood contained very numerous hæmatozoa. Temp. A.M. 38·4°C, P.M. 38·5°C.

30th.—Temp. A.M. 37·1°C, P.M. 37·8°C. No hæmatozoa observed in the blood.

31st.—Temp. A.M. 37·1°C, P.M. 38·4°C. There is a raised circular swelling at the seat of the inoculation 1½″ in diameter which involves the skin only, as it can be lifted up from the subcutaneous tissue. No hæmatozoa observed in the blood.

1st June.—Temp. A.M. 38°C, P.M. 38·3°C. The swelling at the seat of inoculation is larger than yesterday. There is an ulcer the size of a two-anna piece situated on a raised base, at the margin of the right nostril. The surface of the ulcer is yellow in colour. No hæmatozoa observed in the blood.

2nd.—Temp. A.M. 37·6°C, P.M. 38·5°C. The swelling at the seat of inoculation is less tender to the touch; it is still free from adhesions. The ulcer in the right nostril is smaller in size, capillary vessels are observed in some numbers running from the circumference of the base, to the edge of the ulcer, the surface of which latter is covered with yellow coloured pus. Hæmatozoa few in the blood.

3rd.—Temp. A.M. 37·5°C, P.M. 39·4°C. Hæmatozoa very numerous in the blood.

4th.—Temp. A.M. 39°C, P.M. 39·3°C. The swelling at the seat of inoculation is becoming rapidly reduced in size and is losing its tenderness. Hæmatozoa very numerous in the blood.

5th.—Temp. 8 A.M. 40·1°C, 11 A.M. 40·9°C. Hæmatozoa swarming in the blood. Temp. at 1·50 P.M. 41·1°C. Injected 3 grains of Antipyrin into the subcutaneous tissue of the neck. At 2 P.M. temp. 41°C, at 3 P.M. 40·8°C, at 4-30 P.M. 40·7°C. The animal was given 4 grammes of Antipyrin at 5 P.M.; temp. 40·8°C at 6 P.M.; temp. 40·7°C at 8 P.M. The animal's appetite is good.

6th.—Temp. A.M. 40·2°C, P.M. 39·8°C. Hæmatozoa swarming in the blood. At the point of injection of the Antipyrin solution there is a tumor due to a collection of the jelly-like exudation observed in all Surra cases.

7th.—Temp. A.M. 39·4°C, P.M. 39·9°C. Hæmatozoa numerous in the blood.

8th.—Temp. A.M. 39·8°C, P.M. 40·6°C. Hæmatozoa few in the blood.

9th.—Temp. A.M. 40·3°C, P.M. 40·8°C. No hæmatozoa observed in the blood.

10th.—Temp. A.M. 39·7°C, P.M. 40°C. Hæmatozoa few in the blood.

11th.—Temp. A.M. 39·6°C, P.M. 39·9°C. Hæmatozoa numerous in the blood.

12th.—Temp. A.M. 39·7°C, P.M. 39·5°C. Hæmatozoa few in the blood. This morning there is an eruption Urticarial in character, scattered over the neck, shoulders and chest, also a few patches over the abdomen. Each individual patch consists of an elevation of the skin, caused by the deposit of a varying quantity of a yellow coloured jelly-like exudation in the subcutaneous tissue. For the most part these elevations are circular, others oval in form and irregular in size.

13th.—Temp. A.M. 38·8°C, P.M. 39·9°C. Hæmatozoa numerous in the blood.

14th.—Temp. A.M. 39·4°C, P.M. 38·9°C. Hæmatozoa very numerous in the blood. There is some œdema under the abdomen. A slight amount of hæmorrhage took place at 11 A.M. from the small ulcer in the nostril; about 30 drops of the blood were collected and administered in water to horse No. XX.

15th.—Temp. A.M. 38·2°C, P.M. 39·3°C. Hæmatozoa very numerous in the blood.

16th.—Temp. A.M. 39·1°C, P.M. 39·4°C. Hæmatozoa very numerous in the blood. During the night slight hæmorrhage again occurred from the ulcer in the right nostril.

17th.—Temp. A.M. 39·5°C, P.M. 39·1°C. The appetite is poor. Hæmatozoa very numerous in the blood.

18th.—Temp. A.M. 38·2°C, P.M. 39·5°C. Hæmatozoa very numerous in the blood.

19th.—Temp. A.M. 39·1°C, P.M. 39·6°C. Hæmatozoa very numerous in the blood.

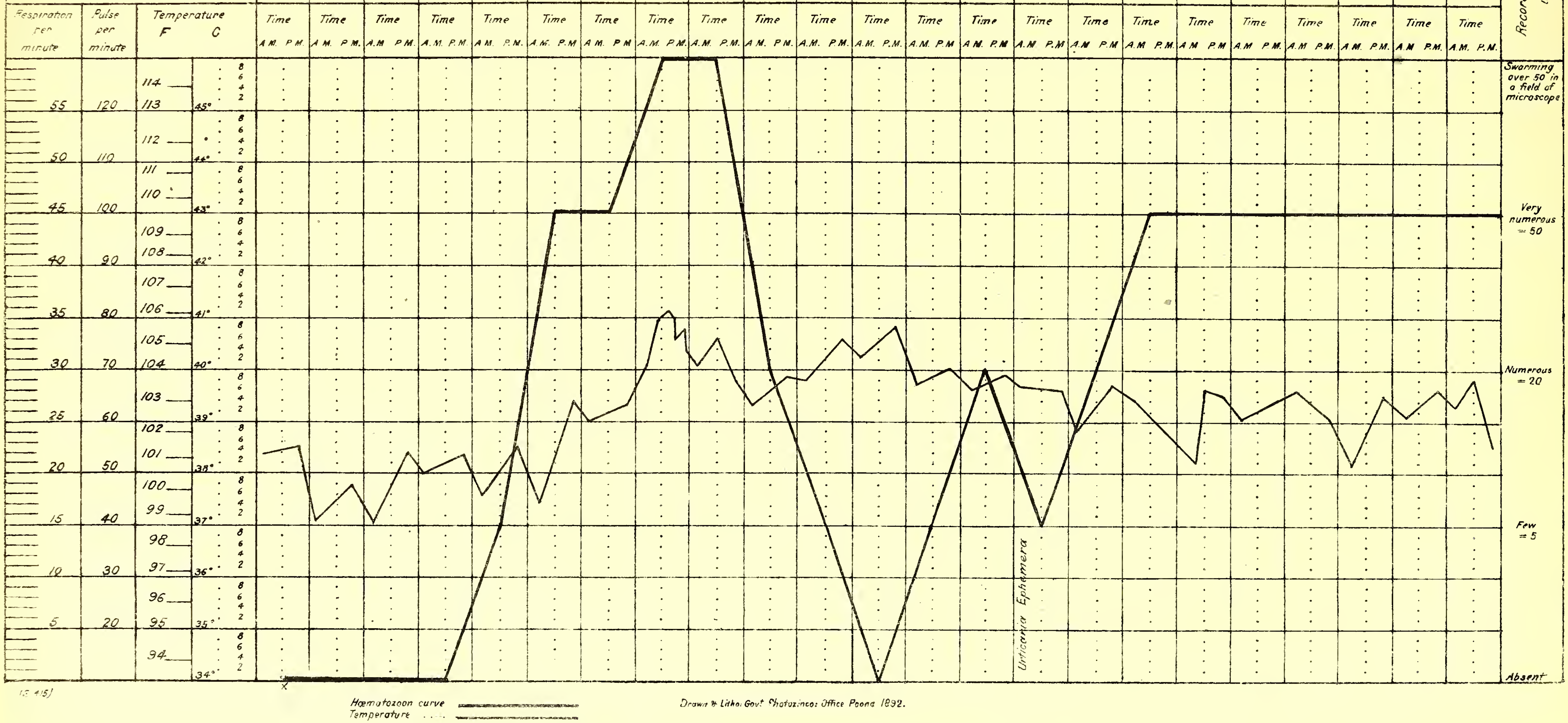
20th.—Temp. A.M. 39·4°C, P.M. 38·6°C. Hæmatozoa very numerous in the blood.

21st.—Temp. A.M. 37°C, P.M. 36·1°C. The animal is much weaker this morning and the appetite is poor. Hæmatozoa very numerous in the blood. There is slight opacity of the right cornea noticed for the first time this morning. Also large ecchymoses under the conjunctiva lying on the sclerotic coat and bordering on the upper and inner edge of the cornea. There is no œdema of the abdomen, but the limbs are swollen and œdematous. The sphincter ani is paralysed.

Date of Inoculation May 29th 1891 — Result Death — Date of Result June 22. 91 — Register No. XXII — Colour Brown

Disease, "Surra" —— Date of Inoculation, May 29th 1891 —— Result, Death —— Date of Result, June 22. 91.—Register No. XXII

Dates of Observation.	May. 29	30	31	June. 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Days of Disease					1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Organisms in Blood.	—	—	—	—	F	V.N.	V.N.	S	S	N	F	—	F	N	F	N	V.N.	V.N.	V.N.	V.N	V.N	V.N	V.N.



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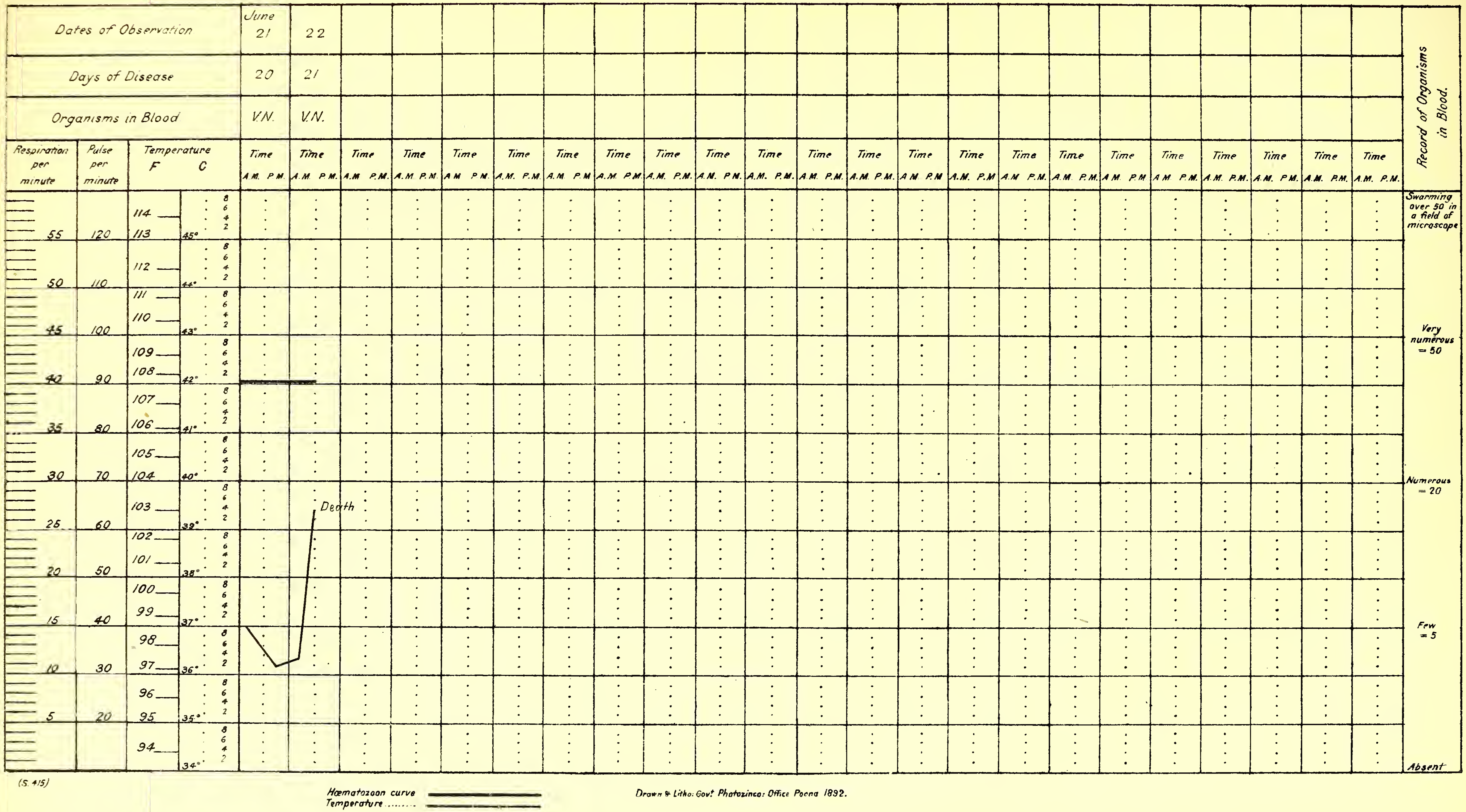
Drawn & Litho: Govt. Photozinco: Office Poona 1892.

x Inoculated Subcutaneously with 1·0 cc. of blood taken from the Jugular Vein of Horse No XXI very numerous hæmatozoa.

Age, Aged —— Sex, Male —— Colour, Brown

Age, Aged Sex, Male Colour, Brown

Disease, "Surra" Date of Inoculation, May 29th 1891 Result Death Date of Result, 22. 6. 91. Register No. XXII



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Drawn & Litho: Govt. Photozinco: Office Poona 1892.

22nd.—Temp. A.M. 36·3°C. Hæmatozoa very numerous. At 11-45 the animal fell. Temp. 1-45 P.M. 39·4°C. Death at 1-50 P.M.

AUTOPSY at 2-30 P.M., 22nd June 1891, forty minutes after death.

The body is somewhat emaciated and there is atrophy of the glutei muscles. There is no fluid in the pleural cavities and no adhesions of the pleuræ.

Lungs.—Are pale in colour, except where there are irregular shaped dark patches, some of which are raised above the surface and are hard to the touch. *On section* these extravasations are found to dip down into and involve the structure of the organ to a depth of $\frac{1}{8}$th of an inch. They are most numerous on the inferior surfaces of both organs, but there are a few scattered on the superior surfaces.

Heart.—The pericardium contains a few ounces of a saffron-coloured fluid. The substance of the organ is pale, but presents no extravasations on its surface. *On section* the *right auricle* and *right ventricle* are found to be distended with recent clots and fluid blood. There are no sub-endocardial ecchymoses in either cavity, with the exception of a small patch lying between the folds of one of the auriculo-ventricular valves. The left side of the heart contains recent dark clot with very little free fluid blood; the wall of the ventricle is somewhat hypertrophied.

Liver.—Weighs 11 lbs. 10 ozs. Is large, dark in colour, with some recent perihepatitis of the left lobe. The organ presents numerous small, round, yellow bodies varying in size from that of a pin's head to $\frac{1}{2}''$ in diameter, all lying under Glissons' capsule and easily enucleable. *On section* of the organ these are found deposited in all parts of the organ.

Spleen.—Weighs 2 lbs. 8 ozs. The tissue of the organ is firm and looks healthy on section. At the pointed extremity of the organ a few ecchymoses are seen lying under the capsule.

Kidneys.—The organs are pale; the capsules strip off easily; there are no ecchymoses on the surfaces and on section nothing abnormal is observable.

Stomach.—Is small, contracted; the walls are thick, the organ weighs 1 lb. 13 ozs. *Externally,* there is nothing abnormal to be seen. *On section* the *cuticular* portion presents a large collection of " œstridæ " and is somewhat more than usual stained a yellow colour. The junction between the cuticular and villous portions and for about an inch on to the former structure, the organ is of a bright orange colour.

The *villous* portion is considerably thickened, the surface is covered with a glairy viscid material like white of egg and through this layer the surface of the organ presents a congested red appearance which when closely examined is found to be made up of small round isolated petechiæ of a red colour, about half an inch in diameter lying a little distance apart, the mean distance between them being about $\frac{1}{8}$th of an inch. Between these circular dark red petechiæ, the mucous membrane of the organ is stained a light reddish hue due to the dissolved blood pigment.

The intestines are healthy.

The points of interest in this case are :—

(i). That the period of incubation, *i.e.,* from the time of inoculation until the first appearance of the hæmatozoon in the blood occupied four days.

(ii). The appearance of an ulcer, the size of a two-anna piece, situated on a raised base, at the entrance to the right nostril on the fourth day after inoculation, and from which hæmorrhage took place on the fourteenth and sixteenth days of the disease.

(iii). That contrary to the general rule, the swelling at the seat of inoculation became more tender, and did not undergo reduction in size at the time when the hæmatozoon first made its appearance in the blood, but retained the above condition for several days.

(iv). That no effect was produced on the temperature (41°C) by the exhibition of large doses of Antipyrin (two drachms).

(v). The appearance of opacity of the cornea of the right eye on the 19th day of the disease, together with an extensive extravasation of blood into the sclerotic coat of the same organ.

(vi). The appearance of an eruption of Urticaria over the neck, shoulders and chest, together with a few patches over the abdomen on the tenth day of the disease.

CASE No. IV.—A GREY, COUNTRY-BRED GELDING, *aged about* 15 *years.* Is an old animal and shows evidence of Melanosis, but is healthy in other respects.

7th November 1891.—Temp. P.M. 38·4°C.

8th November.—Temp. A.M. 38·1°C., pulse 36. Inoculated at 9 A.M., with xv minims of blood containing a few hæmatozoa from the Jugular Vein of horse No. III on the left side of the face.

9th.—Temp. A.M. 38·1°C. No hæmatozoa observed in the blood.

10th.—Temp. A.M. 37·6°C. No hæmatozoa observed in the blood.

11th.—Temp. A.M. 36·8°C. No hæmatozoa observed in the blood.

12th.—Temp. A.M. 37·2°C. No hæmatozoa observed in the blood.

13th.—Temp. A.M. 37·2°C. No hæmatozoa observed in the blood.

14th.—Temp. A.M. 37·2°C, P.M. 38·4°C. No hæmatozoa observed in the blood.

15th.—Temp. A.M. 37·7°C, P.M. 39·8°C. No hæmatozoa observed in the blood.

16th.—Temp. A.M. 39·2°C. Hæmatozoa few in the blood, seven seen in one coverglass preparation, more or less torpid.

17th.—Temp. A.M. 40°C. The animal appears weak and its gait is unsteady. There is swelling and œdema of both fore-limbs. The appetite is good. Hæmatozoa numerous and active in the blood.

18th.—Temp. A.M. 39·1°C. The hind limbs are now becoming swollen and œdematous and the swelling of the fore-limbs has increased in size. Hæmatozoa very numerous and active in the blood.

19th.—Temp. A.M. 40·1°C. Petechiæ present on the conjunctival membranes. The hæmatozoa very numerous in the blood.

20th.—Temp. A.M. 39·3°C. The membrana nictitans of the left eye presents a hæmorrhagic patch covering nearly the whole of its surface. Temp. A.M. 40·6°C. Hæmatozoa very numerous in the blood.

21st.—Temp. A.M. 38·3°C, P.M. 40·7°C. The œdema of the limbs has increased in amount. Hæmatozoa very numerous in the blood.

22nd.—Temp. A.M. 38·8°C, P.M. 40·6°C. Hæmatozoa very numerous in the blood.

23rd.—Temp. A.M. 38·4°C, P.M. 38·3°C. Hæmatozoa numerous in the blood.

24th.—Temp. A.M. 38°C, P.M. 37·9°C. Hæmatozoa very numerous and active in the blood.

25th.—Temp. A.M. 38·4°C, P.M. 39·1°C. Hæmatozoa very numerous in the blood.

26th.—Temp. A.M. 38·5°C, P.M. 39·5°C. Hæmatozoa very numerous in the blood.

27th.—Temp. A.M. 38·5°C, P.M. 39·1°C. Hæmatozoa very numerous in the blood.

28th.—Temp. A.M. 39·1°C, P.M. 38·8°C. A hard tumor of the size of a walnut has formed on the face at the spot from which blood for examination has been repeatedly taken. Hæmatozoa numerous in the blood.

29th.—Temp. A.M. 38·4°C, P.M. 38·3°C. Hæmatozoa numerous in the blood.

30th.—Temp. A.M. 37·7°C, P.M. 39·1°C. Hæmatozoa numerous in the blood.

1st. December—Temp. A.M. 38·4°C, P.M. 38·9°C. Hæmatozoa numerous in the blood.

2nd.—Temp. A.M. 37·3°C. A rapid change for the worse has taken place since yesterday and the horse is in a sinking condition, but he still continues to eat. 2 P.M. fell, death taking place at 3 P.M.

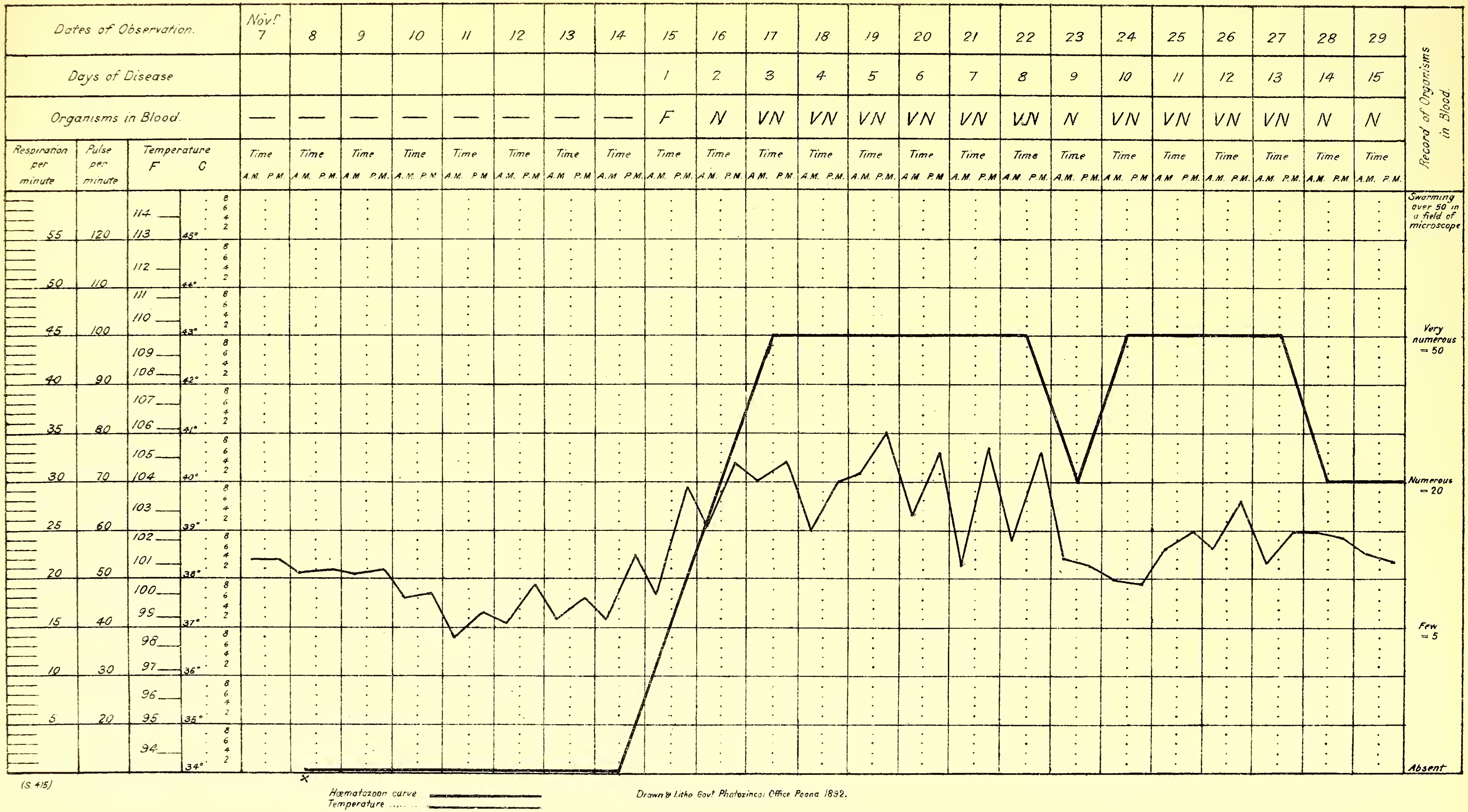
Remarks.—This was an old horse inoculated for the purpose of keeping up the supply of the material. He was inoculated on the 8th November and after a period of eight days the hæmatozoa were found in the blood. On the 16th November they were few in number, 17th numerous and 18th very numerous, and remained so until the 23rd, when they became numerous. During this time the temp. oscillated between 38·3°C and 40·5°C. On the 24th the hæmatozoa were again very numerous and remained so until the 28th, when they again fell to numerous and during these days there had been no corresponding rise of temperature, the highest point reached being 39·6°C. The hæmatozoa remained numerous until the 1st December, the temperature, however, falling steadily until the 30th November on which date there was a slight rise. On the 2nd December the hæmatozoa were very numerous, but the temperature had fallen to 37·3°C and death occurred.

The only point of interest beyond the above is that the animal being an old one and in bad condition the disease was more virulent than usual.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Grey Country-Bred ——— Age, Aged. ——— Sex, Gelding. ——— Colour, White ———

Disease, Inoculated. "Surra". ——— Date of Inoculation, Novr 8th 1890 ——— Result, Death ——— Date of Result, Decr 2· 90. Register No. 4 ———



Dates of Observation.	Novr 7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
Days of Disease									1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Organisms in Blood.	—	—	—	—	—	—	—	—	F	N	VN	VN	VN	VN	VN	VN	N	VN	VN	VN	VN	N	N

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Drawn & Litho Govt Photozinco: Office Poona 1892.

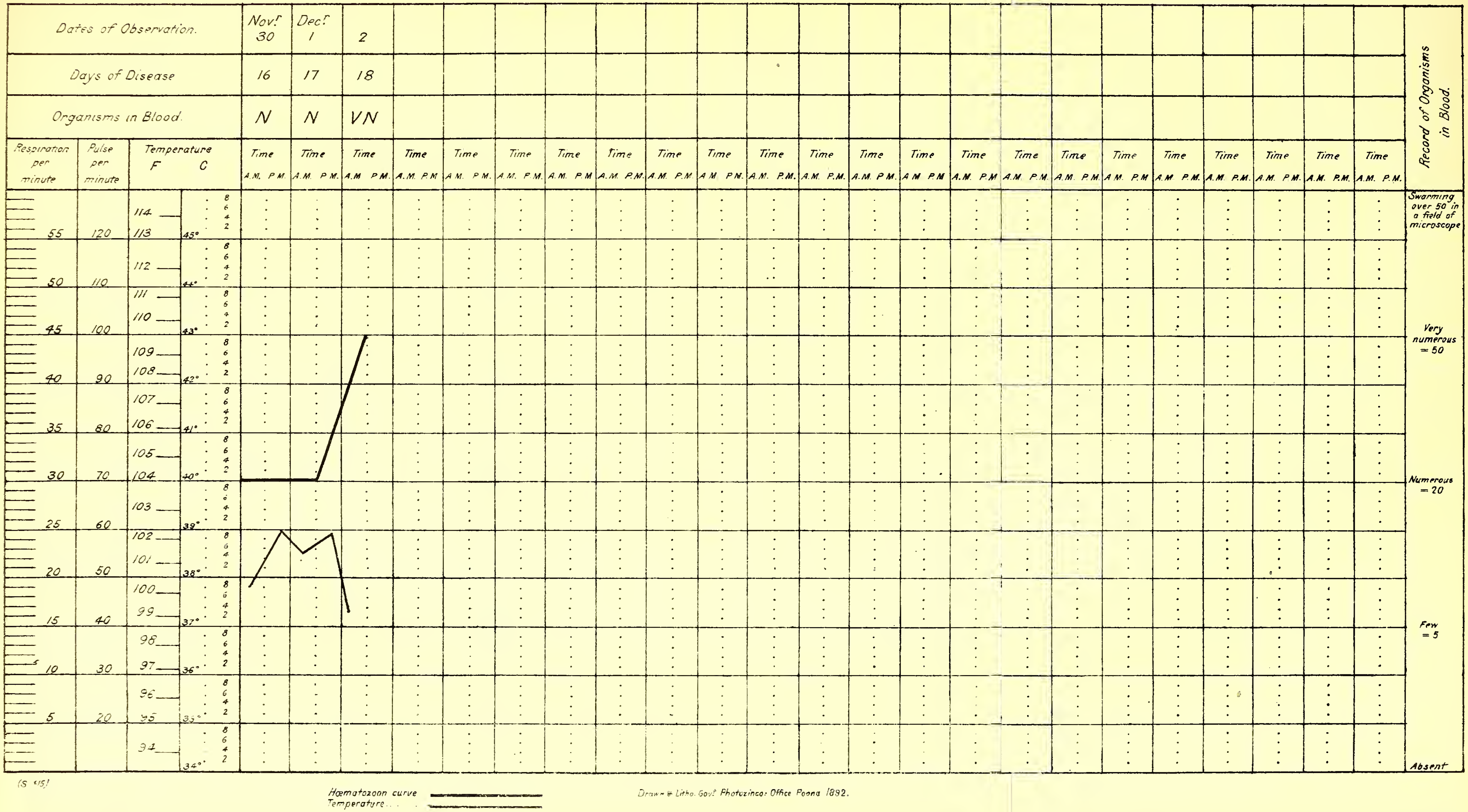
× Inoculated Subcutaneously with 1·0 c.c of blood taken from the Jugular Vein of Horse No. III containing a few hæmatozoa.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age, Aged. Sex, Gelding. Colour, White

Disease, "Surra" Date of Inoculation, Novr. 8th 1890. Result, Death Date of Result, Decr. 2·90 Register No. 4



Dates of Observation.	Novr. 30	Decr. 1	2
Days of Disease	16	17	18
Organisms in Blood.	N	N	VN

(S 15)

Drawn & Litho. Govt. Photozinco: Office Poona 1892.

CASE No. XXX.—DUNN COLOURED COUNTRY-BRED MARE, *aged, lame in the off hind leg, but in fair condition and healthy.*

5th July 1891.—Temp. A.M.—, P.M. 37°C. Blood healthy.

6th „ „ 37·3°C „ 37·3°C „ „

7th.—**11 A.M.** Inoculated subcutaneously over the Left Scapular region with 1 c.c. of blood containing a few hæmatozoa, taken from the right Jugular Vein of horse No. XXIII during life.

8th.—The animal appears healthy, the appetite is good. The visible mucous membranes are clear and normal in colour and the evacuations natural. There is a small swelling at the seat of inoculation, the size of a rupee. Temp. A.M. 37·8°C. The hæmatozoon is absent from the blood. Temp. P.M. 38·1°C.

9th.—The swelling at the point of inoculation has somewhat increased in size, and now presents a raised circular tumor one inch and a half in diameter. Temp. A.M. 38°C. The hæmatozoon is still absent from the blood. Temp. P.M. 38·1°C.

10th.—The condition of the animal is unchanged. Temp. A.M. 36·7°C. The hæmatozoon is absent from the blood. Temp. P.M. 38·3°C.

11th.—The swelling and œdema at the seat of inoculation has increased and now measures 2″ × 2″ × 1″. Temp. A.M. 36·4°C. The hæmatozoa are absent from the blood. Temp. P.M. 38·4°C.

12th.—The condition of the animal remains unchanged. The appetite is good and the evacuations natural. The swelling and œdema at the seat of inoculation have again increased and now measures 3″ × 3″ × 1″. Temp. A.M. 36·6°C. The hæmatozoon is still absent from the blood. Temp. P.M. 38·8°C.

13th.—The swelling and œdema has increased at the lower limit to the extent of three inches and now measures 6″ × 3″ × 1″. Temp. A.M. 36·5°C. The hæmatozoon is absent from the blood. Temp. P.M. 38·3°C.

14th.—The lower half of the œdema, at the seat of inoculation, has been absorbed during the last twenty-four hours, and the tension of the tumour has become less. Temp. A.M. 36·5°C. The hæmatozoon has appeared in the blood for the first time this morning and there are now a few visible. Temp. P.M. 38·8°C.

15th.—The condition of the animal is unchanged. At four o'clock this evening the animal fell, and remained in the same condition until death which took place at 7-30 A.M. on the 16th. Temp. A.M. 37·5°C. There are very numerous hæmatozoa in the blood. Temp. P.M. 37·7°C.

AUTOPSY. At 11 A.M. July 16th, 1891.

The body is fairly well nourished, and there is no swelling or œdema of the extremities or of the under-surface of the abdomen.

Thorax.—There are no pleural adhesions or fluid in the pleural cavities.

The *lungs* fill up the cavity of the chest, the apices and edges of the organs are the seat of localized emphysema. There are some ecchymoses dotted over the superior surfaces of the lungs, at some distance apart, varying in size, the largest being as large as a two-anna piece, the smallest the size of a split pea.

On section the tissues are of a deep red colour, there is no consolidation, but on pressure of the cut surfaces, a little blood and air escape.

The *Pericardium* contains just a trace of a clear straw-coloured fluid.

Heart.—Weighs 5 lbs. 10 ozs., the organ is large, and presents a quantity of yellow coloured exudation in the position usually occupied by the fatty tissue. Dotted over the surface of the muscular tissue, and lying under the visceral pericardium are several ecchymoses which do not dip into the muscular tissue on section.

The *right auricle* and *ventricle* contain some semi-solid dark clot, bathed in fluid blood. There are numerous sub-endocardial extravasations, dotted over the walls of the ventricle, but there are only very few in the auricle. The *left auricle* and *ventricle* contain some semi-solid clots and in the latter is a large yellow coloured solid clot, which runs up into the large vessels. The left auricle presents a healthy appearance. The left ventricular walls are somewhat hypertrophied and there are numerous small sub-endocardial extravasations dotted over the whole surface of the cavity. The valves are healthy.

Liver small and is rapidly undergoing decomposition.

Spleen.—Weighs 3 lbs. 2 ozs., is somewhat soft. The capsule is dotted over with dark red coloured ecchymoses.

Stomach.—Presents on section the peculiar yellow colour, well marked at the junction of the *cuticular* and *villous* portions and which spreads for quite three inches on to the cuticular portion of the organ.

Kidneys.—The right weighs 1 lb. 5 ozs. The left 1 lb. 5 ozs. The capsules strip easily, and disclose numerous small patches of extravasation, lying under the capsule on the cortical portion, together with numerous injected stellate veins.

On section the tissues appear somewhat pale, but the extravasations do not invade the underlying tissues.

Small intestines.—Present a healthy appearance, as also the large bowel.

This animal was only inoculated in order to keep up the supply of material.

The points of interest are :—

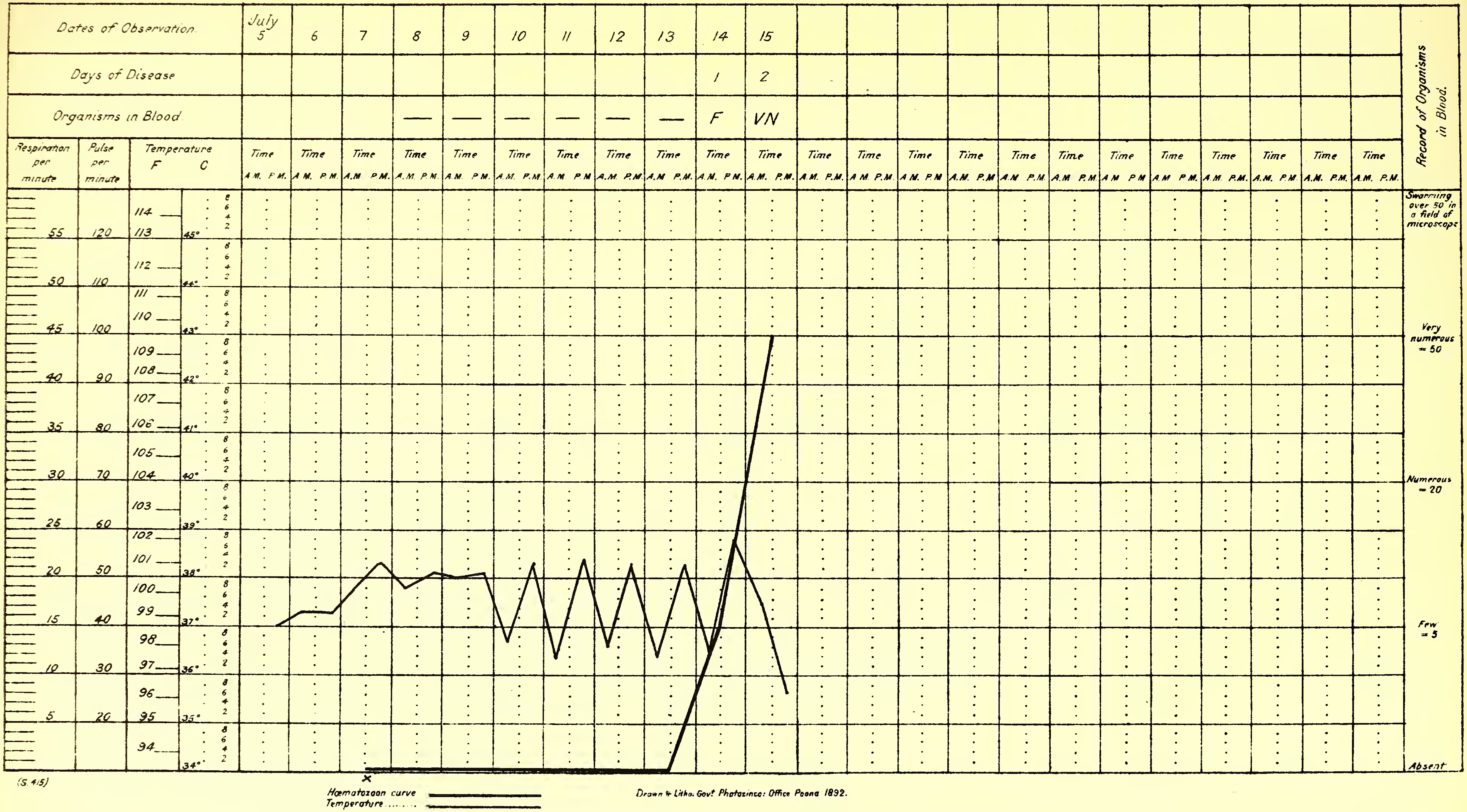
(i). The successful transmission of the disease by the injection of 1 c.c. blood containing a few hæmatozoa at the time of inoculation.

(ii). The time which elapsed between the inoculation of the blood and the first appearance of the hæmatozoon in the blood was seven days.

(iii). The short period which elapsed between the first appearance of the hæmatozoon in the blood and death, *viz.*, one day.

(iv). The pathological lesions involving the lungs, heart and stomach.

Disease Surra ——— Date of Inoculation 7 . 9 . 1891. ——— Result, Death. ——— Date of Result, 15. 7. 91. ——— Register No. XXX.



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Drawn & Litho. Govt. Photozinco: Office Poona 1892.

× Inoculated Subcutaneously with 1·0 c c blood taken from the Jugular Vein of Horse No. XXIII. containing a few hæmatozoa.

CASE No. XXI.—GREY COUNTRY-BRED, *aged, but in fair condition and healthy.*

20th April 1891.—Temp. A.M. Blood healthy. Temp. P.M. 38·5°C.

21st.—Temp. A.M. 38·2°C. Blood healthy. Temp. P.M. 38·5°C.

22nd.—Temp. A.M. 37·7°C. Blood healthy. Temp. P.M. 37·9°C.

23rd.—Temp. A.M. 38·1°C. Blood healthy. Temp. P.M. 38·5°C.

24th.—Temp. A.M. 37·1°C. Blood healthy. Temp. P.M. 37·6°C.

25th.—Temp. A.M. 38·2°C. Blood healthy. Temp. P.M. 38·5°C.

26th.—Temp. A.M. 37·6°C. Blood healthy. Temp. P.M. 37·9°C.

27th.—Temp. A.M. 37·9°C. Blood healthy. Temp. P.M. 38·2°C.

28th.—Temp. A.M. 37·9°C. Blood healthy. Temp. P.M. 38·2°C.

29th.—9 A.M. Inoculated subcutaneously with 1 C.C. of blood over the Left Scapular Region, taken from horse No. XIX; hæmatozoa absent from the injected blood. Temp. A.M. 37·6°C. Blood healthy. Temp. P.M. 38·4°C.

30th.—Temp. A.M. 38·4°C. Hæmatozoa absent from the blood. Temp. P.M. 38·7°C.

1st May.—Temp. A.M. 38·1°C. Hæmatozoa absent from the blood. Temp. P.M. 38·6°C.

2nd.—Temp. A.M. 38·2°C. Hæmatozoa absent from the blood. Temp. P.M. 38·5°C.

3rd.—Temp. A.M. 38·1°C. Hæmatozoa absent from the blood. Temp. P.M. 38·4°C.

4th.—Temp. A.M. 38·1°C. Hæmatozoa absent from the blood. Temp. P.M. 38·5°C.

5th.—There is a circular, raised, cake-like swelling at the seat of inoculation over the Left Scapular Region, 3 inches in diameter, ¾th inch in thickness at the centre and tapering to the free edge. It involves the skin and subcutaneous tissue only, and one can lift it up from the muscle beneath. Temp. A.M. 38·1°C. Hæmatozoa absent from the blood. Temp. P.M. 39·3°C.

6th.—The swelling at the seat of inoculation feels more fixed to the underlying tissues than yesterday, but this may be due to its increased dimensions. Temp. A.M. 40°C. Hæmatozoa absent from the blood. Temp. P.M. 40·4°C.

7th.—The animal looks very dull and depressed. Temp. A.M. 39·9°C. The blood contains a few, very long, and active hæmatozoa. Temp. P.M. 40·5°C.

8th.—The animal looks much brighter to-day and the appetite is good; evacuations normal. The tumor at the seat of inoculation is only half the size it was on the 5th instant; it has become absorbed from the circumference towards the centre. Temp. A.M. 40·2°C. Hæmatozoa numerous in the blood. Temp. P.M. 40·9°C.

9th.—There are some ecchymoses involving the conjunctivæ of both eyes, especially the membranæ nictitantes. Temp. A.M. 40·6°C. Hæmatozoa numerous in the blood. Temp. P.M. 41·7°C.

10th.—There is slight hæmorrhage from the inner canthus of the right eye, due to a ruptured capillary vessel, which blood presents the hæmatozoon on microscopical examination. The raised tumor at the seat of inoculation has considerably diminished in extent and now it is only a hard lump, the size of a small walnut. Temp. A.M. 41·4°C. Hæmatozoa numerous in the blood. Temp. P.M. 39·7°C.

11th.—The animal looks dull and depressed this morning, but the appetite is good and evacuations natural. There is considerable œdema of the scrotum and sheath. Temp. A.M. 39·1°C. Hæmatozoa numerous in the blood. Temp. P.M. 39·8°C.

12th.—Temp. A.M. 39·3°C. Hæmatozoa few in the blood. Temp. P.M. 39·8°C.

13th.—Temp. A.M. 39·6°C. Hæmatozoa absent from the blood. Temp. P.M. 39·9°C. There is some œdema of the extremities, the membranes of the eyes are yellowish in colour.

14th.—At 1 o'clock P.M. (yesterday) administered Sodii Salicylas grammes four. Dose repeated at 7 P.M. and at 7 A.M. Temp. A.M. 39·7°C. Hæmatozoa numerous in the blood. Temp. P.M. 40·5°C.

15th.—The animal has conjunctival ecchymoses, small but well marked. There are two small, irregular shaped extravasations of blood just inside the ala of the right nostril; there is a dark coloured blood clot in the centre of the extravasation and an area of lighter (pink) colour surrounding it, ⅓rd of an inch in width. The animal has now remained standing for four days and nights and the extremities and sheath are therefore the seat of considerable swelling and œdema. The respirations are quick and shallow, 44 per minute. Temp. A.M. 40·2°C. Hæmatozoa very numerous in the blood. Temp. P.M. 41·4°C.

16th.—The swelling and œdema of the extremities, &c., has increased in amount. Temp. A.M. 41·1°C. Hæmatozoa very numerous in the blood. Temp. P.M. 39·2°C.

17th.—There is a flow of clear fluid from the nostrils, which appears to be the effect of catarrh of the mucous membrane of the nasal passages. Temp. A.M. 38·8°C. Hæmatozoa numerous in the blood. Temp. P.M. 38·6°C.

18*th.*—The condition of the animal is unchanged. Temp. A.M. 38·2°C. Hæmatozoa absent from the blood. Temp. P.M. 38·6°C.

19*th.*—The condition of the animal is unchanged. Temp. A.M. 38·2°C. Hæmatozoa numerous in the blood. Temp. P.M. 38·6°C.

20*th.*—The condition of the animal is unchanged. Temp. A.M. 39·2°C. Hæmatozoa very numerous in the blood. Temp. P.M. 39·6°C.

21*st.*—The condition of the animal is unchanged. The discharge of fluid from the nose which five days ago appeared clear like water, has now assumed a greenish colour and has the consistency of white of egg. There are no hæmatozoa in this gelatinous substance, but a large number of leucocytes. Temp. A.M. 40·8°C. Hæmatozoa very numerous in the blood. Temp. P.M. 40·9°C.

22*nd.*—Temp. A.M. 40·7°C. Hæmatozoa numerous in the blood. Temp. P.M. 40·5°C.

23*rd.*—Temp. A.M. 39°C, noon 40°C. Hæmatozoa few in the blood. Temp. P.M. 39·5°C.

24*th.*—Temp. A.M. 38·8°C. Hæmatozoa absent from the blood. Temp. P.M. 38·9°C.

25*th.*—The discharge from nostrils ceased yesterday, the 24th instant. The œdema under the belly is increasing and extends to just on a level with the right and left scapulæ. (Photographed.) Temp. A.M. 38·2°C. Hæmatozoa few in the blood. Temp. P.M. 39·1°C.

26*th.*—The discharge from the nostrils has re-appeared, and is now of a light greenish colour. Temp. A.M. 39·5°C. Hæmatozoa numerous in the blood. Temp. A.M. 39·7°C.

27th.—The œdema now extends between the fore-limbs and in front of the chest. Temp. A.M. 39·9°C. Hæmatozoa very numerous in the blood. Temp. P.M. 39·6°C.

28*th.*—The œdema of the abdominal walls, at the most dependent parts, measures :—

(i) From side to side under the sternum 10¾ inches in width.

(ii) From side to side in the umbilical region 17 inches in width.

(iii) From side to side in front of the sheath 19 inches in width.

This layer of œdematous material is firm to the touch and is five inches in thickness. Temp. A.M. 39·2°C. Hæmatozoa very numerous in the blood. Temp. P.M. 39·4°C.

29*th.*—Temp. A.M. 39°C. Hæmatozoa very numerous in the blood. Temp. P.M. 38·9°C.

30*th.*—Temp. A.M. 38·2°C. Hæmatozoa very numerous in the blood. Temp. P.M. 39·1°C., 7 P.M.—The animal is very weak and has therefore been placed in slings.

31*st.*—The animal is very weak and the appetite is poor, but it drinks a large quantity of water. The blood is pale in colour, and there is a considerable increase in the number of white corpuscles. Temp. P.M. 39·4°C. Hæmatozoa very numerous in the blood. Temp. P.M. 39·8°C.

1*st June.*—There was some bleeding from the left nostril during the night. Temp. A.M. 39·5°C. Hæmatozoa very numerous in the blood. Temp. P.M. 40·4°C.

2*nd.*—Temp. A.M. 39·8°C. Hæmatozoa swarming in the blood. Temp. P.M. 40·2°C.

3*rd.*—Temp. A.M. 39·5°C. Hæmatozoa swarming in the blood. Temp. P.M. 37·4°C.

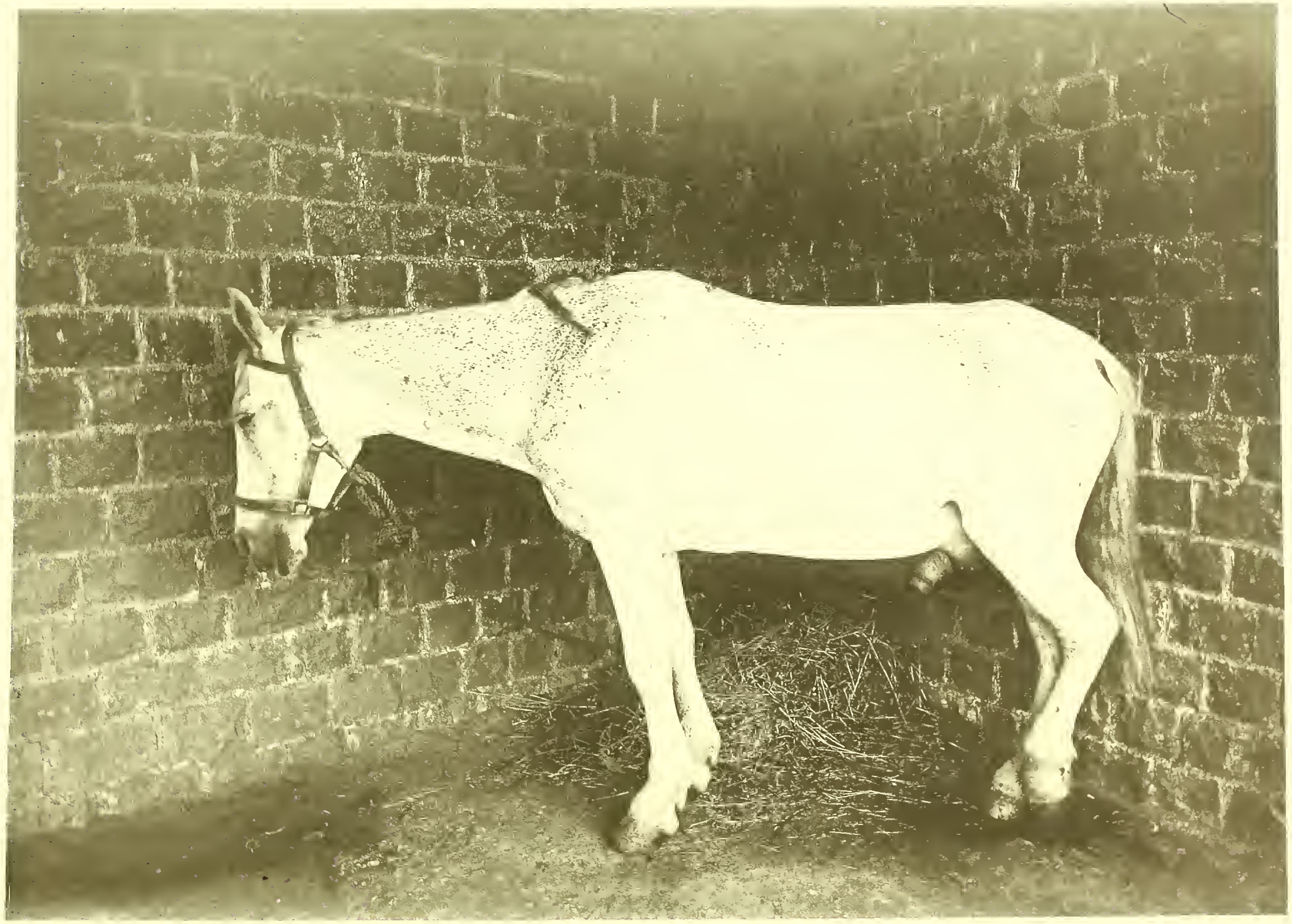
4*th.*—Death took place at 5-45 A.M.

AUTOPSY at 10-30 A.M., 4¾ hours after death. The body is considerably emaciated, the limbs are very slightly œdematous, but the skin of the abdomen and scrotum is considerably distended with semi-gelatinous sherry-coloured jelly.

There is no fluid in the pleural cavities and no adhesions of the parietal and visceral pleuræ.

Lungs.—The visceral pleuræ present a thickened and sodden appearance with opalescent coloured patches on its surface. This appearance is due to the œdema which is lying in the sub-pleural connective tissue, through which the surfaces of the lungs present a variegated appearance, the colours varying from a dark purple to a light pink. The upper lobes of both lungs are the seat of well marked localized emphysema, and the free borders also present circumscribed patches in the same condition. The lungs are large and fully distended with air. On passing the hand over the surface of the organs, several hard tumors irregular in outline are felt. *On section* the colour of the organs is peculiar, but corresponds with that observed in the same organs in several other *Surra* cases, *viz.*, orange, but there are some small circumscribed patches here and there, some pink and others yellow in colour. On pressure frothy blood-stained mucus exudes from the cut surfaces. The hard tumors above mentioned are calcareous bodies which, *on section,* contain caseous material.

Heart.—Is large, the tissues are pale but firm, presenting quite ⅓rd inch to ½ inch of the sherry-coloured jelly lying under the visceral pericardium and running down the course of the two coronary arteries. The right side of the heart is flaccid, containing a few small



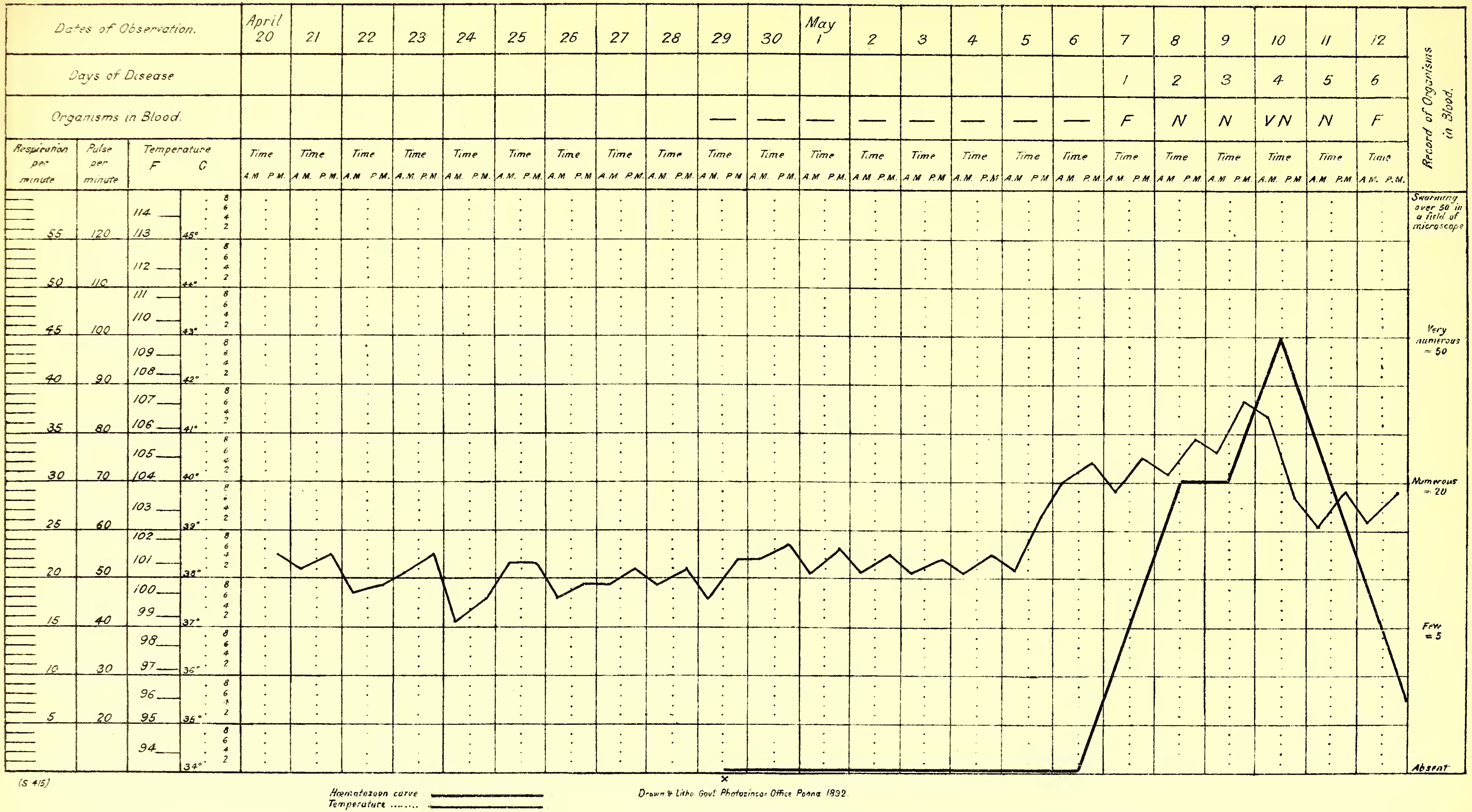
HORSE NO. XXI.

SHEWING THE SWOLLEN AND ŒDEMATOUS CONDITION OF THE EXTREMITIES, SHEATH AND UNDER SURFACE OF THE ABDOMEN, ON THE 19TH DAY OF THE DISEASE.

Date of Inoculation, April 29th 1891. — Result, Death — Date of Result, June 4. 91 — Register No. XXI

Country Bred

Disease, Inoculated "Surra". Date of Inoculation, April 29th 1891. — Result, Death — Date of Result, June 4 · 91 — Register No. XXI



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Drawn & Litho. Gov^t. Photozinco: Office Poona 1892.

× Inoculated Subcutaneously with 1·0 c.c. of blood taken from Horse No XIX, the hæmatozoon being absent from the blood at time of injection

Age

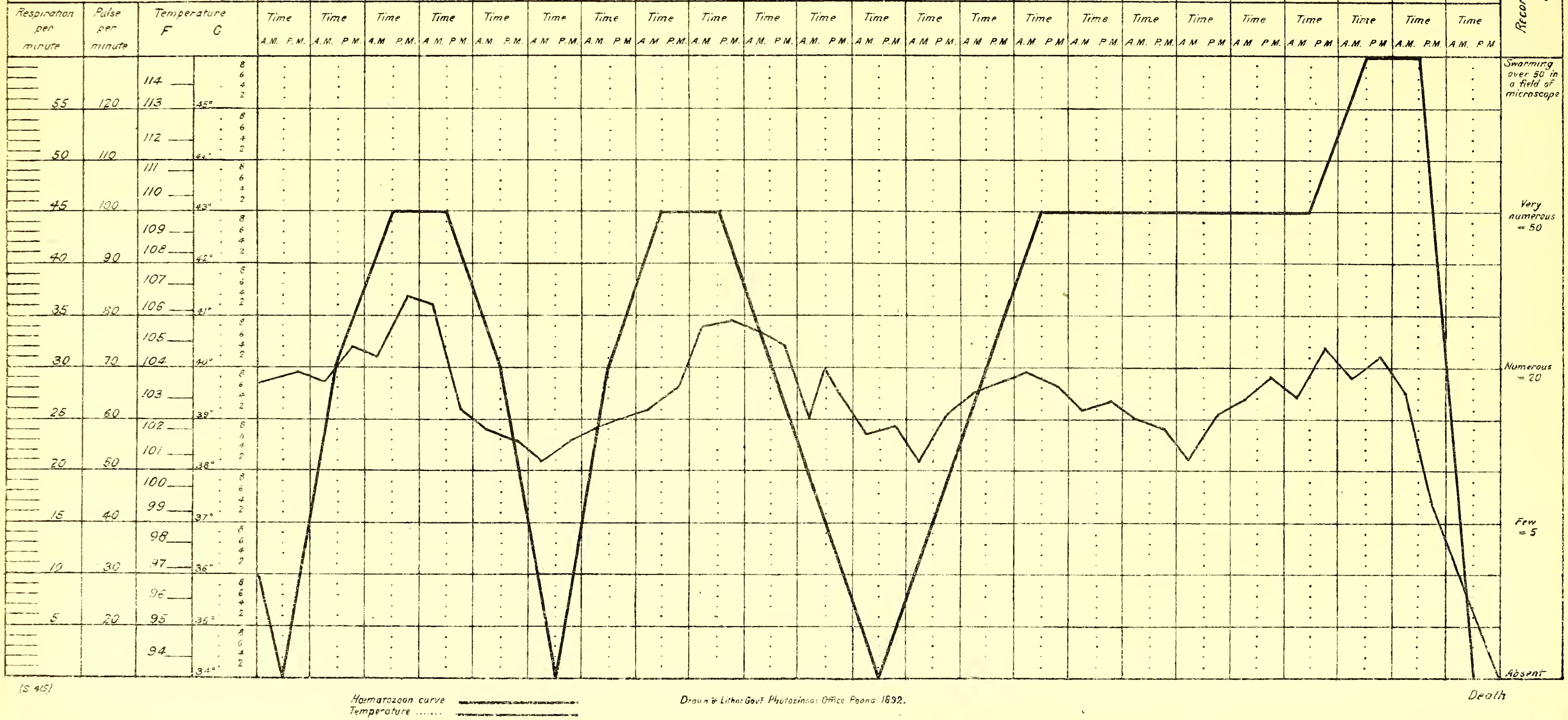
Sex

Colour, Grey

Age _____ Sex _____ Colour, Grey _____

Disease _____ Date of Attack _____ Result _____ Date of Result _____ Register No. XXI _____

Dates of Observation.	May 13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	June 1	2	3	4
Days of Disease	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
Organisms in Blood	—	N	VN	VN	N	—	N	VN	VN	N	F	—	F	N	VN	VN	VN	VN	VN	VN	S	S	



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Drawn & Litho: Govt. Photozinco: Office Poona 1892.

black clots; there are no ecchymoses in the auricle or the ventricle. The valves are healthy. The left side of the heart is contracted, the auricle is healthy. The ventricular walls are hypertrophied. The auriculo-ventricular valves present two circular patches of extravasated blood, purple in colour, one in each of two of the valves, about the size of a four-anna piece. There is some decolorized clot in the left ventricle, but there are no ecchymoses of any kind to be seen lying under the endocardial lining or on the musculi-papillares. The aortic valves are healthy.

Stomach.—Contains some semi-digested food. *On section,* the *cuticular* portion is pale, presenting a healthy appearance, whilst the *villous* is of a dark plum colour; the mucous membrane is much thickened, but there is no sign of any ulceration or abrasion of the lining membrane.

Liver.—Is very large and dark in colour. Glisson's capsule is almost invisible. This is the only liver seen by us up to the present in Surra horses in which perihepatitis of the left lobe was not more or less well marked. There are a number of circular opalescent patches $\frac{1}{12}$th of an inch in diameter with a central yellow minute speck. These are found to lie under the capsule, but do not involve the structure of the organ. In the centre of the anterior surface of the left lobe, a yellow mass $\frac{1}{2}$ inch in diameter is seen which runs through to the opposite surface. It is very hard in consistency and *on section* is found to be externally formed of a thick incrustation of calcareous material, whilst the interior is filled with a yellow coloured cheesy material.

Spleen.—There are several old cicatrices visible on the surface due to previous injuries. There are no ecchymoses on the capsule, and *on section,* the tissue appears normal in structure.

Kidneys.—Large and pale; the capsules strip easily. There are several small, round dark, purple coloured ecchymoses dotted over the surfaces of both organs, at some considerable distance apart, and *on section,* they are found not to invade the cortical structure.

Small intestines.—Contain some few patches of ecchymoses, but there is no ulceration.

Large intestines.—Healthy.

The points of interest are:—

(i). The successful transmission of the disease by the inoculation of 1 cc. of blood from the internal Jugular Vein of an animal, from which the hæmatozoon was absent at the time of inoculation.

(ii). The period of incubation, *i. e.*, the time which elapsed between the inoculation and the first appearance of the hæmatozoon in the blood was eight days.

(iii). The extraordinary quantity of semi-solid exudation into the subcutaneous tissues of the most dependent part of the abdominal wall and extremities.

(iv). The occurrence of Epistaxis towards the termination of the disease.

(v). That after the administration of three doses of Sodii Salicylas amounting to twelve grammes (ʒiij) the temperature should have steadily continued to rise.

(vi). The period which elapsed between the inoculation of the animal and its death was thirty-six days.

(vii). The very slight pathological lesions found at the *Post mortem* examination.

CASE No. XXIX.—BROWN ARAB ENTIRE HORSE, *aged, in fair condition and apparently healthy.*

5th July.—Temp. P.M. 36°C. Blood healthy.

6th.—Temp. A.M. 36·2°C. Blood healthy. Temp. P.M. 36·4°C.

7th.—Temp. A.M. 36·5°C. 11 A.M. Inoculated subcutaneously over the left shoulder, with ·8 c.c. of blood containing a *few* hæmatozoa taken from the internal Jugular Vein of horse No. XXIII. Temp. P.M. 37°C.

8th.—Temp. A.M. 35·5°C. No hæmatozoa in the blood. Temp. P.M. 35·8°C.

9th.—Temp. A.M. 35·6°C. No hæmatozoa in the blood. Temp. P.M. 36°C.

10th.—Temp. A.M. 36·3°C. No hæmatozoa in the blood. Temp. P.M. 37°C.

11th.—Temp. A.M. 35·8°C. No hæmatozoa in the blood. Temp. P.M. 36·7°C.

12th.—Temp. A.M. 36·2°C. No hæmatozoa in the blood. Temp. P.M. 37·8°C.

13th.—The swelling and œdema at the seat of inoculation measures 2·5″ × 1·5″. Temp. A.M. 36·1°C. No hæmatozoa in the blood. Temp. P.M. 37·7°C.

14th.—Right testicle is swollen. There is some fluid in the right Tunica Vaginalis. Temp. A.M. 36·6°C. Hæmatozoa few in the blood in the morning, but numerous in the evening. Temp. P.M. 39·5°C.

15th.—Temp. A.M. 38·3°C. Hæmatozoa very numerous in the blood. Temp. P.M. 39·3°C.

16th.—The right testicle has somewhat increased in size, but it is not painful on manipulation. Temp. A.M. 37·3°C. Hæmatozoa very numerous in the blood. Temp. P.M. 38°C.

17th.—The swelling and œdema at the seat of inoculation is disappearing. There is no tenderness now present. The conjunctivæ are tinged a yellow colour, and there are some small extravasations in the left nostril. The mucous membrane over the right lower turbinated bone is very congested and dark-red in colour. Both testicles are swollen. Temp. A.M. 37·4°C. There are very numerous hæmatozoa in the blood. Temp. P.M. 38·1°C. At 6 P.M. the animal is much weaker and has some difficulty in standing.

18th.—Temp. A.M. 36·5°C. Hæmatozoa swarming in the blood. At 2 A.M. the animal fell and remained lying quietly until 8 A.M. The animal was then lying with its front legs rigid. The breathing was laboured, 20 respirations per minute.

Temp. at 2-30 P.M. 40·7°C. R. 80.
„ „ 3-30 „ 40·3°C. „ 84.

Death took place at 7-30 P.M.

AUTOPSY.—19*th* at 9 A.M.

Decomposition too far advanced for satisfactory examination. The portion of skin at the seat of inoculation was excised shortly after death and placed in alcohol for further examination. The points of interest in this case are :—

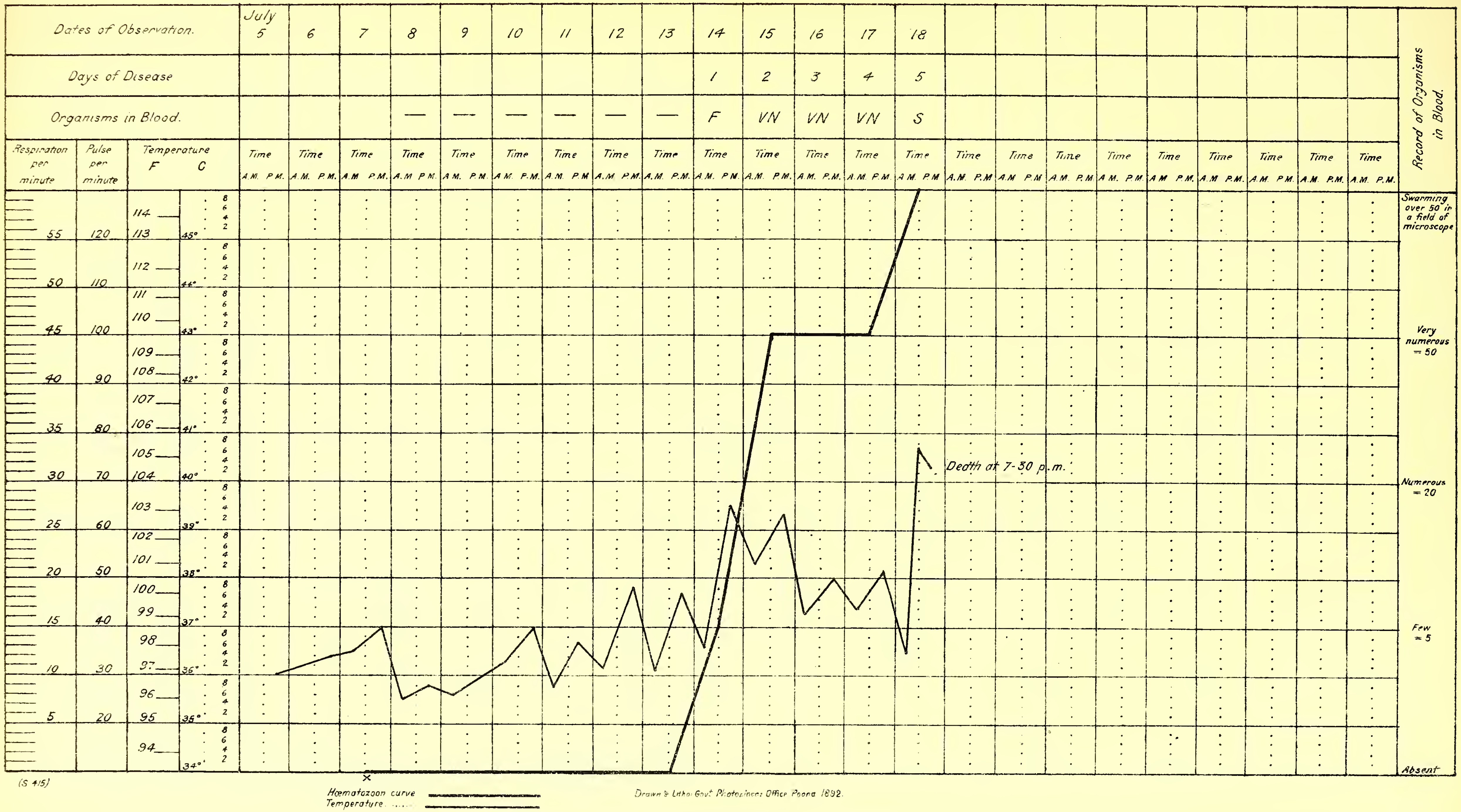
(i). The successful transmission of the disease by the inoculation of ·8 c.c. of blood containing a few hæmatozoa, from the Internal Jugular Vein.

(ii). The period of incubation, *i.e.*, the time elapsing between the inoculation and the first appearance of the hæmatozoon was seven days.

(iii). The short period which elapsed between the appearance of the hæmatozoon in the blood and death, viz., four days.

Brown Arab Entire — Age, Aged — Sex, Entire — Colour, Brown

Disease, Inoculated 'Surra' — Date of Inoculation, 7-7-1891 — Result, Death — Date of Result, 5-7-91 — Register No. XXIX



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Drawn & Litho: Govt. Photozinco: Office Poona 1892.

× Inoculated Subcutaneously with 0·8 cc. of blood taken from the Jugular Vein of Horse No. XXIII, containing a few hæmatozoa.

CASE No. LXIV.—GREY, COUNTRY-BRED PONY, *in fair condition and healthy, aged.*

2nd *June* 1892.—Temp.	P.M. 39·4°C.	P. 36	R. 18.
3rd „	A.M. 36·4°C.	„ 36	„ 13.
„ „	5 P.M. 38·1°C.	„ 36	„ 20.
4th „	A.M. 36·7°C.	„ 40	„ 16.
„ „	P.M. 38·1°C.	„ 36	„ 20.
5th „	A.M. 36·7°C.	„ 40	„ 12.
„ „	P.M. 37·5°C.	„ 44	„ 20.
6th „	A.M. 36·3°C.	„ 36	„ 16.
„ „	P.M. 37·5°C.	„ 36	„ 28.
7th „	A.M. 37·6°C.	„ 36	„ 12.
„ „	P.M. 38°C.	„ 40	„ 16.
8th „	A.M. 37·6°C.	„ 36	„ 16.
„ „	P.M. 37·6°C.	„ 32	„ 12.
9th „	A.M. 36°C.	„ 32	„ 12.
„ „	P.M. 38°C.	„ 44	„ 16.
10th „	A.M. 37·6°C.	„ 36	„ 12.
„ „	P.M. 38°C.	„ 40	„ 12.
11th „	A.M. 35·3°C.	„ 36	„ 12.
„ „	P.M. 38°C.	„ 36	„ 14.
12th „	A.M. 36·4°C.	„ 36	„ 12.
„ „	P.M. 38°C.	„ 40	„ 20.
13th „	A.M. 37·5°C.	„ 44	„ 20.
„ „	P.M. 38·6°C.	„ 36	„ 36.
14th „	A.M. 36·7°C.	„ 33	„ 15.

Inoculated this animal subcutaneously on the left shoulder with ·5 c.c. of blood from the left Jugular Vein of horse No. LXV (Surra naturally acquired).

Temp. 1 P.M. 39·2°C. Temp. 5 P.M. 39·6°C. P. 40. R. 32.

15th.—The animal appears in the same condition as yesterday, there is no swelling at the seat of inoculation.

Temp. A.M. 36·8°C. P. 36. R. 24.

There are no hæmatozoa in the blood. Temp. 1 P.M. 38·6°C.

Temp. 5 P.M. 39·3°C. P. 42. R. 32.

16th.—The condition of the animal is unchanged, there is a small swelling about the size of a marble at the seat of inoculation.

Temp. A.M. 36·8°C. P. 32. R. 14.

There are no hæmatozoa in the blood.

Temp. 1 P.M. 39·3°C.

„ 5 P.M. 38·5°C. P. 52. R. 20.

17th.—The animal looks well, appetite good, the membranes are clear and of normal colour and the evacuations normal.

Temp. A.M. 37·4°C. P. 36. R. 14.

There are no hæmatozoa in the blood. Temp. 1 P.M. 38°C.

Urine.—Yellowish in colour, opaque, Sp. Gr. 1,020, alkaline ; large numbers of striated spheres of Carbonate of Lime stained a deep yellow colour, no albumen. Temp. 5 P.M. 38°C. P. 40. R. 16.

18th.—The condition of the animal is unchanged. The swelling at the seat of inoculation has increased in size and is now 2″ × 1·5″ and is tender on manipulation. Temp. A.M. 37·4°C. P. 32. R. 10.

There are no hæmatozoa in the blood. Temp. 1 P.M. 38°C.

Urine.—Opaque, orange in colour, Sp. Gr. 1,026, no albumen. Temp. 5 P.M. 38·1°C. P. 40. R. 20.

19th.—The animal's condition is as yesterday, with this exception that the swelling is somewhat larger. Evacuations normal. Temp. A.M. 36·8°C. P. 36. R. 20.

There are no hæmatozoa in the blood and nothing abnormal to notice. Temp. 1 P.M. 38·5°C. The urine is orange-coloured, muddy, Sp. Gr. 1,030, alkaline.

Temp. 5 P.M. 38·3°C. P. 40. R. 20.

20th.—The tumor at the seat of inoculation has increased in size and now is somewhat ovoid in shape, the long diameter measuring 3″, the short a little over 1·75″. The swelling is tense and tender on manipulation.

Temp. A.M. 36·7°C. P. 36. R. 12.

There are no hæmatozoa in the blood.

Temp. 1 P.M. 39·1°C.

The urine is yellowish-red in colour, opaque, Sp. Gr. 1,018, alkaline, no albumen, but numerous crystals of Calcium Carbonate. Temp. 5 P.M. 38·3°C. P. 40. R. 18.

21st.—This morning the animal appears somewhat dull, but the appetite is good, there are a few small petechiæ on the conjunctivæ; the evacuations are normal in character. The swelling at the seat of inoculation is soft this morning, the tenseness having passed away.

Temp. A.M. 37·6°C. P. 39. R. 12.

The hæmatozoa are very numerous and active, but rather small in size.

Temp. 1 P.M. 40°C.

The urine is opaque, yellow in colour, Sp. Gr. 1,023, alkaline, no albumen.

Temp. 5 P.M. 40·3°C. P. 40. R. 16.

22nd.—The animal appears very much as yesterday, but the swelling at the seat of inoculation is smaller. The pulse is more frequent, the appetite remains good. Temp. A.M. 39·7°C. P. 64. R. 14.

The hæmatozoa are very numerous in the blood. Temp. 1 P.M. 40·4°C.

Urine.—Sp. Gr. 1,038. Is opaque or cloudy, yellow in colour, alkaline.

Temp. 5 P.M. 40°C. P. 60. R. 20.

23rd.—The animal is very dull this morning, and there are numerous petechiæ on the membranæ nictitantes of both eyes. The appetite is not quite so good as before, but the animal continues to eat slowly.

Temp. A.M. 40°C. P. 60. R. 20.

The hæmatozoa are very numerous in the blood. Temp. 1 P.M. 40·7°C.

Urine.—Turbid, yellow in colour, Sp. Gr. 1,030, alkaline, no albumen.

Temp. 5 P.M. 40°C. P. 56. R. 16.

24th.—The animal is in the same condition.

Temp. A.M. 39·7°C. P. 48. R. 16.

The hæmatozoa are swarming in the blood. Temp. 1 P.M. 41·1°C. The urine is turbid, yellowish-red in colour. Sp. Gr. 1,032, alkaline. Temp. 5 P.M. 41°C. P. 64 R. 16.

25th.—The animal is somewhat brighter this morning, the appetite good, the evacuations normal and the petechiæ are becoming fainter in colour.

Temp. A.M. 39·4°C. P. 56. R. 16.

The urine is turbid, orange in colour. Sp. Gr. 1,026, alkaline, no albumen.

Temp. 1 P.M. 40·7°C. The hæmatozoa are very numerous in the blood.

Temp. 5 P.M. 41°C. P. 68. R. 16.

26th.—The animal continues bright, the temperature has fallen a degree and a half during the night.

Temp. A.M. 39·5°C. P. 60. R. 16.

The hæmatozoa are numerous.

Temp. 1 P.M. 40·8°C.

The urine is turbid, orange in colour, Sp. Gr. 1,018, alkaline, no albumen, numerous crystals of Calcium Carbonate.

Temp. 5 P.M. 41·1°C. P. 64. R. 16.

27th.—No change in the condition of the animal, appetite good, evacuations normal. Temp. A.M. 39·1°C. P. 52. R. 14.

The hæmatozoa are numerous in the blood. Temp. 1 P.M. 40·7°C.

Urine.—Turbid, yellow in colour, Sp. Gr. 1,016, alkaline, no albumen. Temp. 5 P.M. 40·4°C. P. 72. R. 32.

28th.—No change since yesterday in the state of the animal; the petechiæ have disappeared from the membranes and at the seat of inoculation there is only a little thickening to be felt, but there is no tenderness.

Temp. A..M 39·4°C. P. 60. R. 16.

The hæmatozoa continue to be numerous in the blood.

Urine.—Turbid, yellowish-red in colour, Sp. Gr. 1,026, alkaline, no albumen.

Temp. 1 P.M. 40·5°C., 5 P.M. 40·8°C. P. 76. R. 28.

The pulse is full and frequent, but does not intermit.

29th.—The animal is weaker this morning, and eats very slowly.

Temp. A.M. 39·8°C. P. 72. R. 16.

The pulse continues to be frequent, but the respirations have considerably fallen in number. The hind limbs are slightly swollen and the sheath is somewhat œdematous.

Temp. 1 P.M. 40·3°C. P. 80.

The hæmatozoa are very numerous in the blood. Urine, turbid, orange in colour, Sp. Gr. 1,032, alkaline, no albumen. Calcium Carbonate crystals numerous and various in form. Temp. 5 P.M. 40·7°C. P. 80. R. 36.

30th.—The animal is brighter this morning, the temperature has fallen during the night 1·6°C., and the pulse is considerably reduced in frequency.

Temp. A.M. 39·1°C. P. 48. R. 20.

The hæmatozoa are numerous in the blood.

Temp. 1 P.M. 39·5°C.

Urine.—Turbid, yellowish-red in colour, Sp. Gr. 1028, alkaline, no albumen, numerous crystals of Calcium Carbonate, many varieties of form.

Temp. 5 P.M. 39·4°C. P. 68. R. 44.

1st July.—The animal is much weaker, the limbs are more swollen and œdematous and the sheath is in the same state. There are several large petechiæ on the conjunctival membranes. The pulse is weak, frequent and intermits occasionally, once in ten or twelve beats and the action of the heart is irritable.

Temp. A.M. 39·7°C. P. 60. R. 21.

The hæmatozoa are very numerous in the blood. Temp. 1 P.M. 40·8°C. The urine is opaque, orange in colour, Sp. Gr. 1,028, alkaline, but there is no albumen.

Temp. 5 P.M. 39·8°C. P. 72. R. 28.

Animal placed in the slings.

2nd.—The weak condition of the animal continues, but he continues to eat, though slowly.

Temp. A.M. 39·1°C. P. 64. R. 40.

The hæmatozoa are very numerous, and the blood pale.

Temp. 1 P.M. 39·8°C.

The urine is opaque, dirty-orange in colour, Sp. Gr. 1,036, alkaline, no albumen.

The pulse is weak and compressible and has increased in frequency since this morning.

Temp. 5 P.M. 40·2°C. P. 76. R. 36.

3rd.—The animal continues in the same condition.

Temp. A.M. 39·3°C. P. 72. R. 30.

Hæmatozoa swarming in the blood, which continues thin and watery.

Temp. 1 P.M. 40·4°C. Urine, turbid, dirty, Sp. Gr. 1,025, alkaline, no albumen. Temp. 5 P.M. 40·7°C. P. 76. R. 34.

4th.—The animal's condition has remained unchanged. The swelling of the limbs has increased and the swelling and œdema of the sheath have spread forward along the lower portion of the belly.

Temp. A.M. 40°C. P. 60. R. 33.

The hæmatozoa are swarming in the blood. Temp. 1 P.M. 40·8°C.

Urine.—Orange, slightly turbid, Sp. Gr. 1,024, acid, no albumen.

Temp. 5 P.M. 40·7°C. P. 76. R. 32.

5th.—The animal is gradually sinking, but still continues to eat although slowly. The heart's action is very irritable and tumultuous. Temp. A.M. 39·3°C. P. 88. R. 19.

The hæmatozoa are swarming in the blood. Temp. 1 P.M. 40·8°C.

Urine.—Cloudy, orange in colour, Sp. Gr. 1,016, acid, no albumen.

Temp. 5 P.M. 40·8°C. P. 84. R. 40.

6th.—The animal is very much weaker, and all the symptoms aggravated, but the animal continues to eat slowly.

Temp. A.M. 39·4°C. P. 84. R. 25.

The hæmatozoa are swarming in the blood. Temp. 1 P.M. 40·6°C. The urine is clear yellowish-red in colour, Sp. Gr. 1,015, acid, no albumen.

Temp. 5 P.M. 41·2°C. P. 92. R. 60.

7th.—The animal is as weak as it can be, and death will take place during the day. The slings have been removed. Death took place at 3 P.M. Temp. A.M. 39·8°C.

The hæmatozoa are still swarming in the blood.

AUTOPSY.—The body is emaciated, and the extremities swollen and œdematous.

Thorax.—There is no fluid in the pleural cavities and there are no pleuritic adhesions.

The *lungs* present a reddish-pink colour, and the apices are the seat of a localized emphysema. There are no extravasations of blood on the surface of the organs, or caseous nodules. *On section* the tissues appear healthy.

Pericardium contains three ounces of an orange-coloured fluid in which the hæmatozoon was not discovered microscopically.

Heart weighs 5 lbs. 3 ozs. after removal of the blood and clots. *Externally* the base is surrounded by yellow-coloured gelatinous material, but there are only a few petechiæ scattered over its surface. The muscular surface of the cavities is free from ecchymoses. *Internally* all the cavities are free from pathological lesions, with the exception of the left ventricle, and this presents a few small sub-endocardial extravasations, several involving the bases of the musculi-papillares.

Liver shows signs of old perihepatitis and a few yellow concretions small in size dotted over the surface of the organ. *On section* it appears normal and but few yellow bodies are seen invading the tissues.

Spleen weighs 2 lbs. 8 ozs., is enlarged but firm. There are numerous petechiæ involving the capsule.

Stomach.—Is partially distended with semi-digested food. *On section* the *cuticular* portion is normal; the *villous* with the exception of its containing a tumor, the work of the "Spiroptera megastoma" also presents a healthy appearance.

Kidneys.—The right weighs 1 lb. 2½ ozs.; the left 1 lb. 1 oz. The capsules strip easily from both and present a perfectly normal appearance. *On section* the organs present a healthy condition.

The *small intestines* are perfectly healthy.

The *large intestines* do. do.

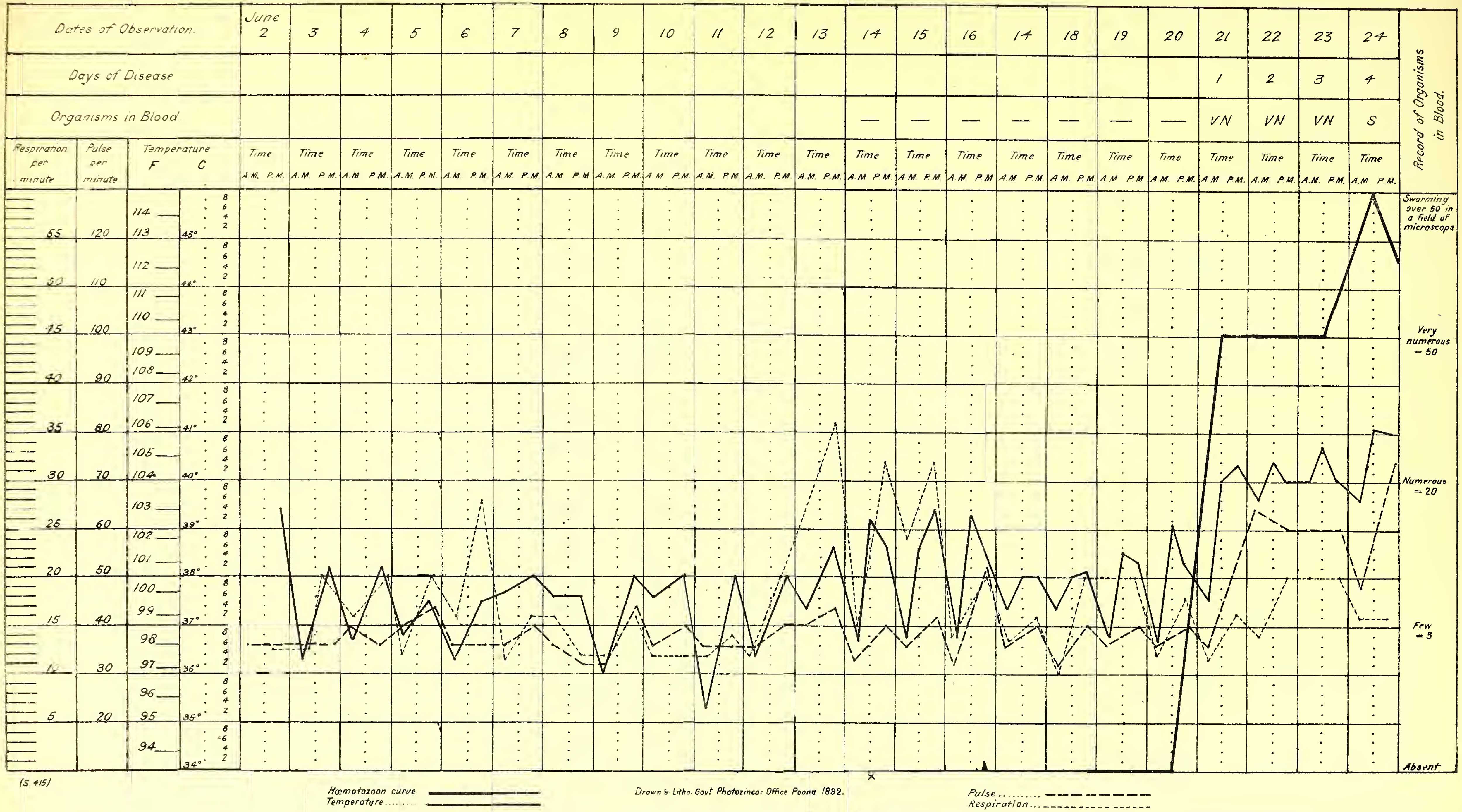
Remarks.—This animal was under observation from the 2nd to the 14th of June, upon which date having in the meanwhile showed no symptoms of disease, it was subcutaneously inoculated on the left shoulder with ·5 c.c. of blood taken from the Internal Jugular Vein of horse No. LXV (naturally acquired Surra), containing a few Surra hæmatozoa. There was slight swelling, the size of a marble at the seat of inoculation on the morning of the second day. 48 hours after the injection of the blood this swelling increased considerably in size and tension up to the 20th June 1892 and continued to do so until the morning of the 20th. On the morning of the 21st the tumor was found to have lost its tension and become soft, a sure sign that the hæmatozoa had become generalized in the blood, which was verified on microscopical examination. The first period during which time the hæmatozoa were very numerous and afterwards swarming in the blood lasted for five days, the temperature oscillating between 37·6°C and 41·1°C. An interval of three days then occurred, during which the hæmatozoa were numerous, and this was followed by an increase in their number and again by a decrease; they then became very numerous and swarming and thus continued until death, the temperature varying between 39·1°C and 41·2°C.

The points to be observed in this case are:—

(i). The first appearance of the swelling at the seat of inoculation forty-eight hours after the injection of the blood containing only a few hæmatozoa.

(ii). The increase in size accompanied with increased tension of the tumor until the morning of the 20th June, followed on the next day by loss of tension and decrease in size of the swelling, and the presence of very numerous hæmatozoa in the blood.

Disease, Inoculated 'Surra' —— Date of Inoculation, 14. 16. 1891 —— Result, Death —— Date of Result, 7. 7. 91. —— Register No. **LXIV**



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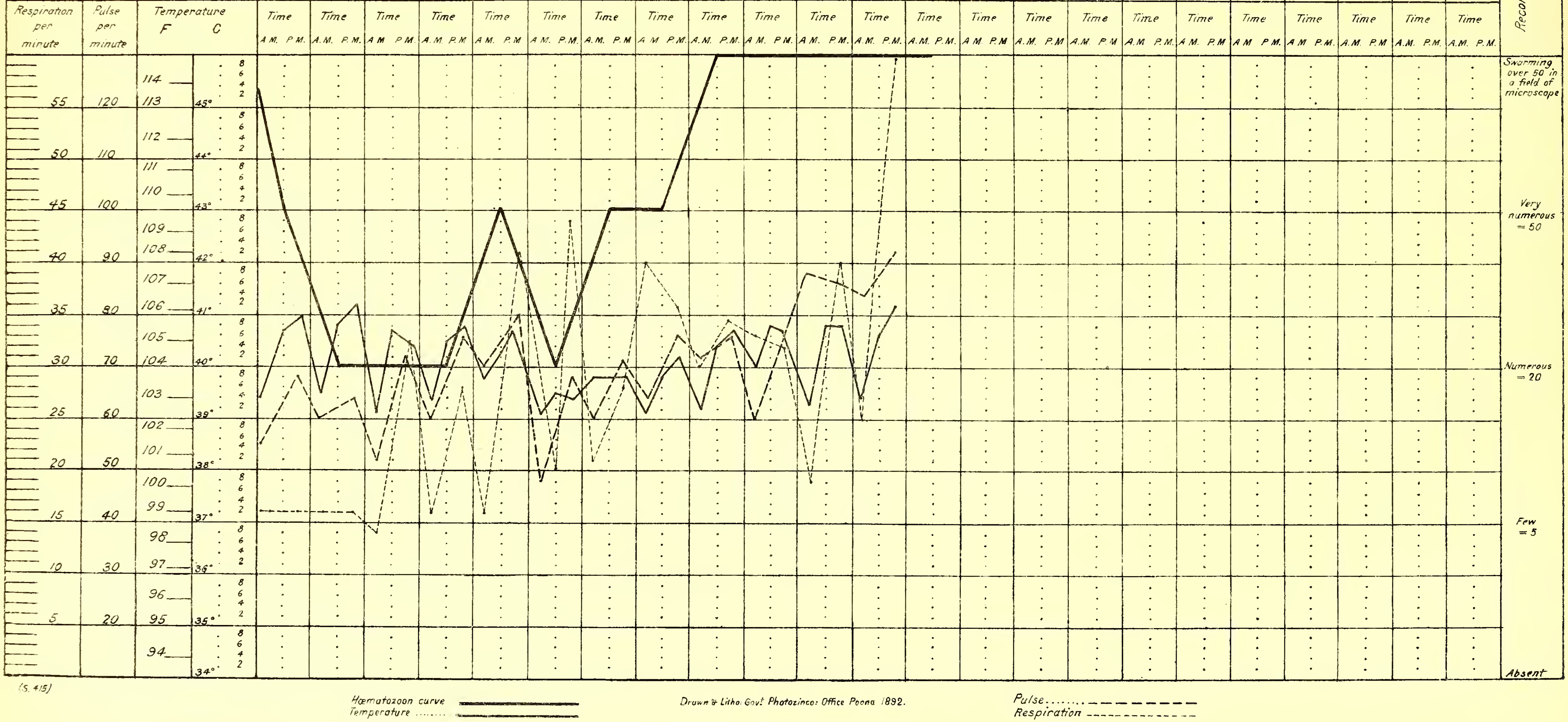
Drawn & Litho: Govt Photozinco: Office Poona 1892.

× Subcutaneously inoculated with 0·5 cc. of blood taken from the left Jugular Vein of Horse Nº LXV. containing a few hæmatozoa.

Age — Sex — Colour, Grey

Disease — Date of Attack — Result — Date of Result — Register No. LXIV

Dates of Observation.	June 25	26	27	28	29	30	July 1	2	3	4	5	6	7										Record of Organisms in Blood.
Days of Disease	5	6	7	8	9	10	11	12	13	14	15	16	17										
Organisms in Blood.	VN	N	N	N	VN	N	VN	VN	S	S	S	S	S										



Drawn & Litho: Govt Photozinco: Office Poona 1892.

(iii). The first appearance of the hæmatozoon in the animal's blood was on the 8th morning after inoculation or 168 hours after injection of blood from No. LXV horse.

(iv). The inoculated disease was localized for seven days to the seat of inoculation and did not become generalized until after the expiration of about 168 hours.

(v). The possibility of adopting radical treatment should be noted in inoculated cases during the period elapsing between the inoculation of the virus and before the first appearance of the hæmatozoon in the blood.

RECORDS OF URINE.

Animal, Grey C. B. Pony No. LXIV. *Date* { *Inoculated 14th June 1892.* / *Death 7th July 1892.* }

Disease, Surra from No. 65.

Date.	Quantity.	Colour.	Re-action.	Specific Gravity.	Albumen.	Phosphates.	Remarks.
1892. June 17 ...	......	Turbid, yellow ...	Alkaline ...	1,020	No ...	No ...	$CaCo_3$ very numerous striated spheres large and small and oxalates.
18 ...	......	Do. orange ...	Do. ...	1,026	No ...	No ...	,, and oxalates ,, ,,
19 ...	......	Do. do. ...	Do. ...	1,030	No ...	No ...	,, ,, ,, ,,
20 ...	......	Do. yellowish-red.	Do. ...	1,018	No ...	No ...	,, ,, ,, ,,
21 ...	......	Do. yellow ...	Do. ...	1,023	No ...	No ...	,, ,, ,, ,,
22 ...	......	Do. do. ...	Do. ...	1,038	No ...	No ...	,, ,, ,, ,,
23 ...	......	Do. do. ...	Do. ...	1,030	No ...	No ...	,, ,, ,, ,,
24 ...	......	Do. yellowish-red.	Do. ..	1,032	No ...	No ..	,, ,, ,, ,,
25 ...	......	Do. orange ...	Do. ...	1,026	No ...	No ...	,, ,, ,, ,,
26 ...	......	Do. do. ...	Do. ...	1,018	No ...	No ...	,, ,, ,, ,,
27 ...	......	Do. yellow ...	Do. ...	1,016	No ...	No ...	,, ,, ,, ,,
28 ...	......	Do. yellowish-red.	Do. ...	1,026	No ...	No ...	,, ,, ,, ,,
29 ...	......	Do. orange ...	Do. ...	1,032	No ...	No ...	,, ,, ,, various forms.
30 ...	......	Do. yellowish-red.	Do. ...	1,028	No ...	No ...	,,
July 1 ...	......	Do. orange ...	Do. ...	1,028	No ...	No ...	,, less in quantity.
2 ...	......	Do. do. ...	Do. ...	1,036	No ...	No ...	,, still less in quantity.
3 ...	......	Do. do. ...	Do. ...	1,025	No ...	No ...	,, absence of any on boiling.
4 ...	......	Do. slightly-orange.	Acid	1,024	No ...	No ...	,, absence complete.
5 ...	......	Do. do. ...	Do. ...	1,016	No ...	No ...	,, absent.
6 ...	......	Clear yellowish-red.	Do. ...	1,015	No ...	No ...	,, absent.
7 ...	Death ...	......	......	...	...	......	

CASE No. LIX.—HORSE, C. B., *entire, aged, healthy and in fair condition.*

25th April.—Temp.	A.M. 37·4°C.	P. 28.	R. 20.
" "	P.M. 38·1°C.	" 29.	" 20.
26th "	A.M. 38·1°C.	" 29.	" 20.
" "	P.M. 38·1°C.	" 29.	" 22.
27th "	A.M. 36·8°C.	" 27.	" 20.
" "	P.M. 38·1°C.	" 29.	" 21.
28th "	A.M. 35·8°C.	" 28.	" 20.
" "	P.M. 37·7°C.	" 29.	" 23.
29th "	A.M. 36·5°C.	" 27.	" 21.
" "	P.M. 38·1°C.	" 29.	" 20.
30th "	A.M. 36°C.	" 28.	" 22.
" "	P.M. 37·4°C.	" 30.	" 20.
1st May. "	A.M. 36·7°C.	" 28.	" 23.
" "	P.M. 37·6°C.	" 31.	" 22.
2nd "	A.M. 36·2°C.	" 27.	" 22.
" "	P.M. 37·8°C.	" 31.	" 22.
3rd "	A.M. 37·7°C.	" 27.	" 22.
" "	P.M. 38·1°C.	" 32.	" 22.

This animal after having been under supervision for some weeks, was inoculated subcutaneously this afternoon at 4 P.M. with ·5 c.c. of blood drawn from the internal Jugular Vein of horse No. LVIII.

4th.—The animal does not appear to have suffered in consequence of yesterday's inoculation; there is no sign at the point where the injection was made. There are no hæmatozoa in the blood.

Temp. A.M. 37·7°C. P. 32. R. 22.

" 1 P.M. 38·1°C.

" 5 P.M. 38·1°C. P. 34. R. 24.

5th.—The condition of the animal is unchanged, there is no swelling at the seat of inoculation.

Temp. A.M. 38·1°C. P. 30. R. 22.

There are no hæmatozoa in the blood.

Temp. 1 P.M. 38·1°C., 5 P.M. 38·3°C. P. 42. R. 22.

6th.—The animal appears in good health.

There is a small lump circular in form, 1 inch in diameter, and very slight tenderness on pressure. Temp. A.M. 38·1°C. P. 32. R. 28.

Temp. 1 P.M. 38·1°C., 5 P.M. 38·1°C. P. 56. R. 30.

7th.—The animal appears bright, the appetite is good and the evacuations are normal. The swelling at the seat of inoculation is larger than yesterday and more tender to the touch.

Temp. A.M. 37·5°C. P. 30. R. 22.

There are no hæmatozoa in the blood.

Temp. 1 P.M. 38·3°C. Temp. 5 P.M. 38·1°C. P. 32. R. 30.

8th.—The animal did not lie down during the night, and this morning looks rather dull. The swelling before mentioned has extended and now the tumor measures 3·5″ × 2″ and the tenderness has somewhat increased. Temp. A.M. 37·4°C. P. 32. R. 27.

Hæmatozoa absent from the blood.

At 1 P.M. the temperature was found to have run up to 39·1°C., and the tumor at 3 P.M. had become smaller and less tense; on examination of the blood a few hæmatozoa were discovered, very active in their movements. Temp. 5 P.M. 39°C. P. 32. R. 25.

9th.—This morning the tumor at the seat of inoculation is considerably reduced in size and now measures 1·5″ × ·75″.

Temp. A.M. 39·3°C. P. 36. R. 20.

The hæmatozoa are now numerous in the blood. Temp. 1 P.M. 40·1°C.

Temp. 5 P.M. 40·8°C. P. 40. R. 26.

10th.—This morning the animal looks considerably pulled down and the appetite is not so good. Temp. A.M. 40·4°C. P. 60. R. 24.

The tumor is still smaller and the tissues soft and movable. The hæmatozoa are swarming in the blood. The temp. at 1 P.M. was 41·1°C., and at 5 P.M. was 41·2°C. P. 66. R. 33.

11*th.*—The condition of the animal is the same, but the sheath is somewhat swollen and œdematous.

Temp. A.M. 40·3°C. P. 40. R. 26.

The hæmatozoa still remain swarming in the blood. The animal did not lie down in the night.

Temp. 1 P.M. 40·4°C.

Temp. 5 P.M. 40·4°C. P. 52. R. 30.

12*th.*—This morning the animal is worse and the disease is running its usual course, the legs are becoming swollen and œdematous, but the appetite continues good.

Temp. A.M. 39·3°C. P. 60. R. 26.

The hæmatozoa have decreased in number and are now numerous. Temp. 1 P.M. 40·8°C. Temp. at 5 P.M. 40·6°C. P. 50. R. 29.

13th.—To-day there is no change in the state of the animal.

Temp. A.M. 40·7°C. P. 63. R. 36.

The hæmatozoa have again increased and are swarming. The Temp. at 1 P.M. rose to 40·8°C., but fell at 5 P.M., when it was 40·4°C. P. 56. R. 26.

14*th.*—The condition remains unchanged.

Temp. A.M. 40·1°C. P. 60. R. 25.

The appetite remains good, and the hæmatozoa have fallen in number to numerous again. Temp. 1 P.M. 40·5°C.

Temp. 5 P.M. 40·7°C. P. 61. R. 24.

15*th.*—The condition of the animal is unchanged. Temp. A.M. 39·5°C. P. 54. R. 36.

The hæmatozoa are now still fewer than yesterday, but the mid-day temperature has somewhat risen to 40°C.

At 5 P.M. the temperature attained 40·2°C. P. 68. R. 32.

16*th.*—This morning there is swelling of the limbs as before, but there is swelling and œdema under the belly running forward between the fore-limbs.

Temp. A.M. 39·5°C. P. 60. R. 52.

The hæmatozoa are few in the blood.

Temp. 1 P.M. 40·1°C., 5 P.M. 39·8°C. P. 60. R. 52.

17*th.*—The animal's appetite still continues to be good and it eats all the corn and grass given to it. The sheath is considerably swollen, and the œdema, &c., of the belly has increased and extended to the chest, there are râles in the trachea from the mucus collected at the lower end.

Temp. A.M. 38·1°C. P. 52. R. 20.

There are extensive ecchymoses on the conjunctivæ and some blood has escaped from the vessels and the secretion at the inner canthi is blood-stained. This mucus contains hæmatozoa, large in size and active in their movements.

Temp. 1 P.M. 40·2°C. There are only a few hæmatozoa in the blood.

Temp. 5 P.M. 39·5°C. P. 54. R. 48.

18*th.*—All the above symptoms are the same as yesterday, but if anything, are somewhat more aggravated.

Temp. A.M. 38·6°C. P. 60. R. 40.

The hæmatozoa are numerous in the blood. Temp. at 1 P.M. was 41°C and at 5 P.M. was 41°C. P. 62. R. 38.

19*th.*—The condition of the animal is gradually getting worse, and it is becoming weaker, but at present the appetite is not impaired.

Temp. A.M. 39·6°C. P. 72. R. 64.

The hæmatozoa have run up again in number and are very numerous. Temp. 1 P.M. 40·6°C.

Temp. 5 P.M. 40·5°C. P. 80. R. 64.

20*th.*—The animal is distinctly weaker and will succumb within forty-eight hours, but still continues to eat slowly.

Temp. A.M. 38·5°C. P. 104. R. 60.

The hæmatozoa are swarming in the blood. The temperature at mid-day rose to 40·2°C., but commenced to fall during the afternoon; at 5 P.M. the temperature was 39·8°C. P. 120. R. 66.

The animal gradually became weaker and fell at 8 P.M., and death took place at 9-30 P.M.

AUTOPSY.—Early on the morning of the 21st. The body is emaciated, and there is considerable swelling and œdema of the under-surface of the belly lying between the skin and the abdominal muscles and extending forwards between the fore-limbs up on to the chest, and backwards to the sheath and scrotum. On section, a considerable quantity of jelly-like material is found, of a sherry colour, somewhat firm at first, but on standing, serum runs gradually from it.

On opening the thorax, about a pint of amber-coloured fluid is observed in each pleural cavity, but there are no adhesions of the parietal and visceral pleuræ.

Right lung is dotted over its surface with numerous small ecchymoses and a few about the size of a split-pea. These are dark in colour and on section are found to be lying below the visceral pleura. The tissue of the lung on section presents a yellowish-red colour, is distended with air and healthy.

Left lung.—The ecchymoses are fewer in number, otherwise this organ is in the same condition as the right.

Heart weighs 4 lbs. 7 ozs. There are a few ounces of fluid in the cavity of the *pericardium* dark yellow in colour. The external surface of this organ presents the same pathological conditions found in most cases. The base is surrounded by orange-coloured jelly material in lieu of the ordinary fat seen in temperate climates. The *right ventricle* has numerous small extravasations lying under the visceral pericardium and a few running down the course on either side of the anterior coronary vessels. The *left ventricle* is free from these ecchymoses. *On section* the right side of the heart contains numerous clots, which extend up into the large vessels and are of an orange colour. There are a few sub-endocardial extravasations, very small in the right auricle; but there are several more extensive ones in the right ventricle. The valves are healthy. The *left auricle* is free from ecchymoses. The *left ventricle* is contracted, the cavity very small and the walls thick and certainly hypertrophied. There are only a few ecchymoses lying under the endocardial lining and these are small in size. The valves are not involved and are healthy.

Stomach.—Apparently healthy and normal.

Liver.—Weighs 12 lbs. 11 ozs. Old signs of inflammation of the capsule on its convex surface, the right lobe presents numerous small yellow bodies, hard to the touch; the left ditto, but fewer in number. *On section* the tissue looks dark, but healthy, and some few concretions imbedded in the substance of the tissue, are easily enucleable.

Spleen.—Weighs 4 lbs. 2 ozs. Numerous ecchymoses on the surface. *On section*, the tissue is firm and healthy looking.

Kidneys.—Right 1 lb. 10 ozs. Left 1 lb. 10½ ozs. In both, the capsules strip easily and present a few purple spots, varying in size mostly about the size of a pin's head, which on section are found to dip down into the cortical portion. Organs pale.

Small intestines, no patches of congestion or ecchymoses.

Large intestines, healthy; there are no parasites in the intestines.

Remarks.—This animal was under observation for a long period previous to inoculation, viz., February 18th to May 3rd 1892, and being in fair condition and healthy was inoculated on May 3rd at 4 P.M.

A small swelling appeared at the seat of inoculation on the 6th May which gradually increased in size and became very tense and tender to the touch. On the morning of the 8th there were no hæmatozoa in the blood on microscopical examination, but at 1 P.M. the temperature rose to 39·1°C., and at 3 P.M. the tumor had become softer and less tense. On examination of the blood a few hæmatozoa were then observed. The above-mentioned rise in temperature was the commencement of a period of elevation and recrudescence which lasted for three days. The highest point attained was 41·3°C., and on the morning of the fourth day (12th) it fell to 39·4°C.; during the 10th and 11th the hæmatozoa were swarming in the blood and on the 12th became numerous. This appears to have been an abortive attempt on the part of the temperature to become normal and for the hæmatozoa to disappear from the blood. During the next three days the temperature varied between 39·2°C. and 40·8°C., the hæmatozoa again for one day being found swarming in the blood. For the next three days the temperature remained below 40°C., except at mid-day, and the hæmatozoa were few. On the morning of the 17th temperature nearly touched 38°C., but again rose on the 18th to 41°C. and then gradually fell. The hæmatozoa were numerous and on the 20th swarming and remained so until death which took place at 9-30 P.M.

The points to be observed in this case are:—

(i). The first appearance of the swelling at the seat of inoculation sixty hours after the injection of blood containing hæmatozoa.

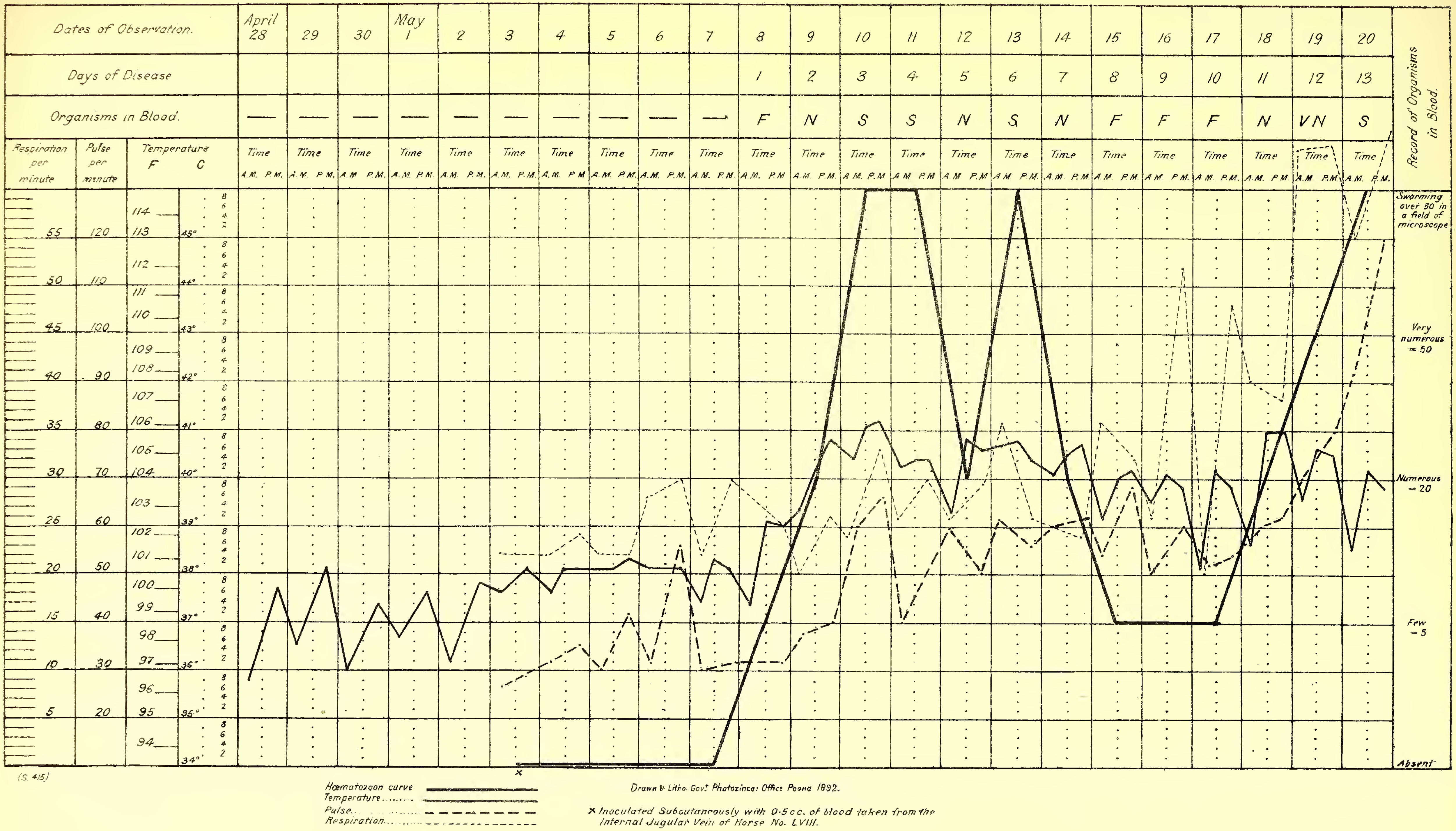
(ii). The increase in size of the tumor accompanied by tension and tenderness until the morning of the 8th of May, when the tumor commenced to subside, became less tense and tender.

(iii). The first appearance of the hæmatozoa in the animal's blood was on the fifth day or 119 hours after the inoculation of blood from horse LVIII.

(iv). The inoculated disease in this case was localized for 4½ days at the seat of inoculation and did not become generalized until after mid-day on the 8th May.

(v). The possibility of adopting radical treatment in such cases during the period elapsing between the inoculation of the virus and the first appearance of the hæmatozoon in the blood.

Disease, "Surra" inoculated —— Date of Inoculation, May 4th 1892. —— Result, Death. Date of Result May 20. 92. — Register No. LIX. ——



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Drawn & Litho. Govt. Photozinco: Office Poona 1892.

× Inoculated Subcutaneously with 0·5 c.c. of blood taken from the internal Jugular Vein of Horse No. LVIII.

CASE No. LIV.—CHESTNUT COUNTRY-BRED HORSE, *aged, in fair condition, but apparently healthy.*

19th Dec. 1891.—The animal on admission is in fair condition, the visible mucous membranes are clear, the conjunctival membranes free from petechiæ. There is no swelling or œdema of the extremities, the appetite is excellent, and the evacuations natural in character. Temp. A.M. 36·7°C. P. 36. R. 11. The blood appears healthy and is free from hæmatozoa. Urine is turbid, viscid, yellow in colour. Sp. Gr. 1,030. Alkaline, no albumen, but numerous crystals of Carbonate of Lime, striated spheres large and small, dumb-bell crystals of Oxalate of Lime. Temp. P.M. 38°C.

20th.—General condition unchanged. Temp. A.M. 36·4°C. P. 34. R. 12. The blood is healthy. Temp. P.M. 37·6°C.

21st.—Condition unchanged. Temp. A.M. 35·8°C. P. 30. R. 11. The blood is healthy. Temp. P.M. 38°C.

22nd.—Condition unchanged. Temp. A.M. 36·5°C. P. 31. R. 12. The blood is healthy. Temp. P.M. 37·7°C.

23rd.—Condition unchanged. Temp. A.M. 36·8°C. P. 30. R. 11. The blood is healthy. Temp. P.M. 37·4°C.

24th.—Condition unchanged. Temp. A.M. 36·4°C. P. 28. R. 10. The blood is healthy. Temp. P.M. 37°C.

25th.—Condition unchanged. Temp. A.M. 36·6°C. P. 29. R. 10. The blood is healthy. Temp. P.M. 37·3°C.

26th.—Condition unchanged. Temp. A.M. 35·8°C. P. 33. R. 11.

Inoculated the animal subcutaneously over the Left Scapular Region with 0·1 C.C. of blood containing swarms of hæmatozoa taken from the Internal Jugular Vein of Horse No. LVI (naturally acquired Surra). Temp. P.M. 37·4°C.

27th.—There is a small raised swelling an inch in diameter at the seat of inoculation, which is somewhat tense and tender to the touch. The visible mucous membranes are clear and free from petechiæ. Temp. A.M. 36·1°C. P. 28. R. 11. The blood is free from hæmatozoa.

Temp. 1 P.M. 37·2°C. The urine is turbid, viscid, orange in colour. Sp. Gr. 1,028. Alkaline, no albumen. Temp. 5 P.M. 37·6°C.

28th.—The animal looks well and bright, the swelling and œdema at the seat of inoculation has increased in extent and now measures two inches in diameter, the tension and tenderness have increased at the same time. The appetite is good and the evacuations are healthy in character. Temp. A.M. 36·2°C. P. 22. R. 8. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·6°C. Urine, turbid, viscid, orange in colour. Sp. Gr. 1031. Alkaline, no albumen. Temp. 5 P.M. 37·8°C.

29th.—The general condition of the animal is unchanged. The swelling and œdema have slightly increased in extent since yesterday and the tension and tenderness remain the same. Temp. A.M. 36·5°C. P. 36. R. 9. The hæmatozoon is absent from the blood of the general circulation. On passing the needle of a Pravaz syringe into the above tumor and on microscopical examination of the deeply blood-stained fluid withdrawn from it, several hæmatozoa were observed. They were of medium size and very active in their movements and indistinguishable from those found previously in other cases at any stage of the disease. Temp. 1 P.M. 38·7°C. Urine, turbid, viscid, orange in colour. Sp. Gr. 1,026. Alkaline, no albumen. Temp. 5 P.M. 38°C.

30th.—The animal appears fairly well, the visible mucous membranes are clear, as also the conjunctival membranes; the skin is not hot, and there is no œdema of the extremities. The swelling and œdema at the seat of inoculation is, as far as one can judge, the same as yesterday with this exception that the tension of the tumor is less. The appetite is good and the excretions healthy. Temp. A.M. 37·8°C. P. 42. R. 8. The hæmatozoa are few in the blood. Temp. 1 P.M. 40·2°C. Urine, turbid, viscid, orange in colour. Sp. Gr. 1,026. Alkaline, no albumen. Temp. 5 P.M. 39·6°C.

31st.—The swelling and œdema at the point of inoculation is reduced in size, and the tenderness on manipulation is also disappearing rapidly. Up to the present the conjunctival membranes are free from petechiæ. Appetite good, evacuations healthy. Temp. A.M. 39°C. P. 45. R. 9.

The hæmatozoa are few in the blood. Temp. 1 P.M. 40·7°C. Urine, turbid, viscid, of a dirty yellow colour. Sp. Gr. 1,033. Alkaline, no albumen. Temp. 5 P.M. 40·6°C.

1st January 1892.—The general condition of the animal appears the same as yesterday. The swelling and œdema at the seat of inoculation are rapidly disappearing. Temp. A.M. 40°C. P. 39. R. 9.

The hæmatozoa are few in the blood. Temp. 1 P.M. 40·3°C. Urine, turbid, viscid, dirty yellow in colour. Sp. Gr. 1,036. Alkaline, no albumen, crystals of Calcium Carbonate, also a few Oxalates of Calcium. Temp. 5 P.M. 40·4°C.

2*nd.*—The animal this morning appears dull, but is not off its feed, there are a few small petechiæ on the conjunctival membranes. Temp. A.M. 38·3°C. P. 38. R. 11.

The hæmatozoa are numerous in the blood. Temp. 1 P.M. 40·4°C. Urine, turbid, viscid, dirty brownish-red in colour. Sp. Gr. 1,034. Alkaline, a mere trace of albumen. Temp. 5 P.M. 41·8°C.

3*rd.*—Condition unchanged. Temp. A.M. 37·1°C. P. 41. R. 13.

The hæmatozoa are few in the blood. Temp. 1 P.M. 37·2°C. Urine, turbid, viscid, orange in colour. Sp. Gr. 1,032. Alkaline, a trace of albumen. Temp. 5 P.M. 37·2°C.

4*th.*—The animal is brighter this morning, and the appetite is very good. Temp. A.M. 37·1°C. P. 41. R. 6.

The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·7°C. Urine, turbid, viscid, orange in colour. Sp. Gr. 1022. No albumen, crystals of Calcium Carbonate in abundance. Temp. 5 P.M. 37·6°C.

5*th.*—The animal continues to be bright and looks healthy. Temp. A.M. 37·4°C. P. 42. R. 14. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·6°C. Urine, turbid, viscid, bright yellow in colour. Sp. Gr. 1,023. Alkaline and no albumen, Calcium Carbonate crystals. Temp. 5 P.M. 38°C.

6*th.*—Condition of the animal is unchanged. Temp. A.M. 37·5°C. Pulse 45. Resp. 9. The hæmatozoa are few in the blood. Temp. 1 P.M. 37·7°C. Urine, turbid, viscid, yellow. Sp. Gr. 1,026. Alkaline, no albumen. Temp. 5 P.M. 38°C.

7*th.*—The condition of the animal is unchanged. Temp. A.M. 39·2°C. Pulse 50. Resp. 10. Hæmatozoa are numerous in the blood. Temp. 1 P.M. 40·2°C. Urine, turbid, viscid, muddy orange in colour. Sp. Gr. 1,034. Alkaline, no albumen. Temp. 5 P.M. 42°C.

8*th.*—With the exception of a few petechiæ on the conjunctival membranes, the condition of the animal is unchanged. Temp. A.M. 37·3°C. P. 58. R. 30.

The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·4°C. Urine, turbid, viscid, muddy-yellow in colour. Sp. Gr. 1,030. Alkaline, a trace of albumen. Temp. 5 P.M. 37·7°C.

9*th.*—Condition unchanged. Temp. A.M. 37·1°C. Pulse 44. Resp. 14. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·3°C. Urine, turbid, viscid, orange in colour. Sp. Gr. 1,025. Alkaline, a trace of albumen. Temp. 5 P.M. 37·7°C.

10*th.*—The animal appears to be in the same state as it has been for several days; there are a few petechiæ on the conjunctival membranes which are fading, the visible mucous membranes are clear. Temp. A.M. 38·1°C. P. 40. R. 10. The hæmatozoa are absent from the blood. Temp. 1 P.M. 38·2°C. Urine, turbid, viscid, yellowish-red in colour. Sp. Gr. 1,023. Alkaline, no albumen, numerous crystals of Calcium Carbonate and some Oxalates. Temp. 5 P.M. 38·2°C.

11*th.*—This morning the animal looks dull and stupid; there are fresh petechiæ on the conjunctival membranes, the skin is hot and dry and the appetite is not so good. Temp. A.M. 40·4°C. P. 56. R. 11. The hæmatozoa are very numerous in the blood. Temp. 1 P.M. 40·8°C. Urine, turbid, viscid, orange in colour. Sp. Gr. 1,036. Alkaline, a trace of albumen. Temp. 5 P.M. 41°C.

12*th.*—The condition of the animal is unchanged. Temp. A.M. 38·7°C. P. 72. R. 22. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·4°C. Urine, turbid, viscid, orange in colour. Sp. Gr. 1,027. Alkaline, a trace of albumen. Temp. 5 P.M. 38°C.

13*th.*—The animal is much brighter this morning. Temp. A.M. 38·1°C. P. 44. R. 9. The hæmatozoon is absent from the blood. Temp. 1 P.M. 37·8°C. Urine, turbid, viscid, yellow in colour. Sp. Gr. 1,028. Alkaline, no albumen. Temp. 5 P.M. 38·5°C.

14*th.*—Condition unchanged. Temp. A.M. 37·8°C. P. 38. R. 16. The hæmatozoa are absent from the blood. Temp. 1 P.M. 37·8°C. Urine, turbid, viscid, yellow in colour. Sp. Gr. 1,027. Alkaline, no albumen. Temp. 5. P.M. 38·2°C.

15*th.*—Condition unchanged. Temp. A.M. 37·8°C. Pulse 39. Resp. 13. The hæmatozoa are absent from the blood. Temp. 1 P.M. 37·8°C. Urine, turbid, viscid, yellow in colour. Sp. Gr. 1,023. Alkaline, no albumen. Temp. 5 P.M. 38·1°C.

16*th.*—The animal is again dull and sleepy, somewhat off its feed, the skin is hot and dry. The eyes are watery and the visible mucous membranes injected, the extremities are somewhat œdematous, but not painful on manipulation. Temp. A.M. 40·1°C. P. 61. R. 10. The hæmatozoa are numerous in the blood. Temp. 1 P.M. 41·1°C. Urine, turbid, viscid, muddy-yellow in colour. Sp. Gr. 1,032. Alkaline, no albumen. Temp. 5 P.M. 42·1°C.

17th.—The condition of the animal is unchanged. Temp. A.M. 38·2°C. Pulse 62. Resp. 10. The hæmatozoa are few in the blood. Temp. 1 P.M. 38·2°C. Urine, turbid, viscid, muddy, reddish-yellow in colour. Sp. Gr. 1,036. Alkaline, a trace of albumen. Temp. 5 P. M. 38·2°C.

18th.—Condition is improved since yesterday, the animal is brighter and feeds well, the evacuations are healthy. Temp. A. M. 37·5°C. P. 50. R. 11.

The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·1°C. Urine, turbid, viscid, yellow in colour. Sp. Gr. 1,030. Alkaline, no albumen. Temp. 5 P.M. 37·8°C.

19th.—Condition unchanged. Temp. A.M. 38·1°C. P. 48. R. 18.

The hæmatozoon is absent from the blood. Temp. 1 P.M. 38°C. Urine, turbid, viscid, yellowish-red in colour. Sp. Gr. 1026. Alkaline, no albumen. Temp. 5 P.M. 38·2°C.

20th.—Condition unchanged. Temp. A.M. 37·4°C. Pulse 42. Resp. 10. The hæmatozoa are few in the blood. Temp. 1 P.M. 39·5°C. Urine, turbid, viscid, orange in colour. Sp. Gr. 1029. Alkaline, no albumen. Temp. 5 P.M. 40·1°C.

21st.—The animal is dull and sleepy, the pulse hard and full and the appetite poor. Temp. A. M. 40·4°C. P. 68. R. 14.

The hæmatozoa are very numerous in the blood. Temp. 1 P.M. 41·4°C. Urine, turbid, viscid, orange in colour. Sp. Gr. 1,033. Alkaline, no albumen. Temp. 5 P.M. 41·1°C.

22nd.—The animal is brighter this morning and is feeding well, but there is some œdema of the extremities which are hot but not painful, and the sheath is œdematous. Temp. A.M. 39·3°C. P. 69. R. 11. The hæmatozoon is absent from the blood. Temp. 1 P.M. 40°C. Urine, turbid, viscid, yellow in colour. Sp. Gr. 1,028. Alkaline, no albumen. Temp. 5 P.M. 39·6°C.

23rd.—The general condition of the animal is unchanged. The sheath is swollen and the œdema is extending gradually in front of it. Temp. A.M. 38·8°C. P. 54. R. 10.

The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·7°C. Urine, turbid, viscid, orange in colour. Sp. Gr. 1,023. Alkaline, no albumen. Temp. 5 P.M. 39·6°C.

24th.—The condition of the animal is unchanged. Temp. A.M. 39·1°C. P. 48. R. 12. The hæmatozoon is absent from the blood. Temp. 1 P.M. 39·6°C. Urine, turbid, viscid, Sp. Gr. 1,027. Alkaline, no albumen. Temp. 5 P.M. 39·7°C.

25th.—The animal is brighter than yesterday and is feeding well; the visible mucous membranes are tinged a light-yellow colour, but the petechiæ are fading, the œdema on the under-surface of the abdomen continues to spread forwards. Temp. A.M. 39·7°C. P. 48. R. 11.

The hæmatozoa are few in the blood. Temp. 1 P.M. 40·3°C. Urine, turbid, viscid, orange in colour. Sp. Gr. 1,026. Alkaline, no albumen. Temp. 5 P.M. 39·8°C.

26th.—The condition of the animal is unchanged. Temp. A.M. 40·1°C. P. 63. R. 12.

The hæmatozoa are few in the blood. Temp. 1 P.M. 40·3°C. Urine, turbid, viscid, orange in colour. Sp. Gr. 1,021. Alkaline, no albumen, numerous crystals of Carbonate of Lime. Temp. 5 P.M. 40·4°C.

27th—The animal is decidedly brighter and the membranes are clearer, but the condition of the extremities continues, as also the œdema of the under-surface of the abdomen. Temp. A.M. 39·8°C. P. 62. R. 12.

The hæmatozoa are few in the blood. Temp. 1 P.M. 39·4°C. Urine, turbid, viscid, dirty-yellow with a sediment. Sp. Gr. 1,029. Alkaline, no albumen. Temp. 5 P.M. 40°C.

28th.—The condition is unchanged. Temp. A.M. 39·6°C. Pulse 62. Resp. 12. The hæmatozoa are few in the blood. Temp. 1 P.M. 40·2°C. Urine, turbid, viscid, yellow in colour. Sp. Gr. 1,032. Alkaline, no albumen. Temp. 5 P.M. 40·2°C.

29th.—Condition unchanged, the general symptoms of Surra are steadily progressing. Temp. A.M. 39·6°C. P. 66. R. 14. The hæmatozoa are few in the blood. Temp. 1 P.M. 39·5°C. Urine, turbid, viscid, yellow in colour. Sp. Gr. 1,028. Alkaline, no albumen. Temp. 5 P.M. 40·1°C.

30th.—The condition of the animal is unchanged. Temp. A.M. 39·3°C. Pulse 55. Resp. 12. The hæmatozoa are few in the blood. Temp. 1 P.M. 39·4°C. Urine, turbid, viscid, orange in colour. Sp. Gr. 1,036. Alkaline, no albumen. Temp. 5 P.M. 40·3°C.

31st.—The animal appears weaker, but the appetite remains just as good as ever. Temp. A.M. 39·7°C. P. 58. R. 16. The hæmatozoa are few in the blood. Temp. 1 P.M. 40°C. Urine, turbid, viscid, orange in colour. Sp. Gr. 1,028. Alkaline, no albumen, Carbonates. Temp. 5 P.M. 40·1°C.

1st February.—Condition unchanged. Temp. A.M. 39·4°C. P. 69. R. 16. The hæmatozoa are few in the blood. Temp. 1 P.M. 40°C. Urine, turbid, viscid, muddy-yellow coloured. Sp. Gr. 1,031. Faintly alkaline, no albumen, no crystals of Carbonate and only a trace of effervescence on the addition of Acetic Acid. Temp. 5 P.M. 40°C.

2nd.—The animal appears dull and sleepy, hangs its head, but brightens up occasionally to feed and then again relapses. Temp. A.M. 39·8°C. P. 66. R. 14. The hæmatozoa are numerous in the blood. Temp. 1 P.M. 40·1°C. Urine, not so turbid or viscid, orange in colour. Sp. Gr. 1,037. Faintly acid, no albumen. Temp. 5 P.M. 40·1°C.

3rd.—The animal is decidedly weaker, the swelling and œdema is spreading between the fore-limbs, but the appetite remains good. Temp. A.M. 40°C. P. 80. R. 18. The hæmatozoa are swarming in the blood. Temp. 1 P.M. 40·1°C. Urine, clear, viscidity has disppeared, of a reddish-yellow colour. Sp. Gr. 1,026. Acid, no albumen, absence of Carbonates. Temp. 5 P.M. 40·3°C.

4th.—The condition of the animal is unchanged. Temp. A.M. 38·6°C. P. 75. R. 24.

The hæmatozoa are swarming in the blood. Temp. 1 P.M. 39·6°C. Urine, clear, strongly acid, orange in colour. Sp. Gr. 1,022. No albumen, absence of Carbonates. Temp. 5 P.M. 40°C.

5th.—The animal is very much weaker and the œdema has extended on to the chest. Temp. A.M. 39·8°C. P. 64. R. 22.

The hæmatozoa are swarming in the blood. Temp. 1 P.M. 40·3°C. Urine clear, absence of viscidity. Sp. Gr. 1,018. Strongly acid, no albumen, absence of Carbonates. Temp. 5 P.M. 39·4°C.

6th.—The animal is much weaker and has assumed the recumbent position. Temp. A.M. 39·4°C. P. 68. R. 26.

At 10 A.M. after a short period of struggling death took place.

AUTOPSY held at 12-30 P.M. Body somewhat emaciated, there is considerable œdema of the extremities and of the under-surface of the abdomen. No fluid in the pleural cavities.

Lungs.—Dotted over with a few sub-pleural blood extravasations not invading the tissues to any extent. *On section* the lung tissue is stained somewhat yellow in colour with a bright-red flush.

Heart.—Weighs 4 lbs. 15 ozs. Many extravasations externally, especially down the course of the coronary vessels—yellow jelly-like exudation round the base and running to a smaller extent along the course of the vessels. No pathological changes observed in any of the cavities of the organ with the exception of the left ventricle. Here an extravasation about ¾th inch in length and half an inch in width is situated on one of the musculi-papillares lying under the endocardial lining.

Spleen.—2 lbs. 8½ ozs., firm in texture, covered on the convex surface with small extravasations of blood.

Liver.—Weighs 13 lbs. 11 ozs. The external appearance is normal and *on section* healthy.

Kidneys.—No extravasations under the capsule. Right weighs 1 lb. 7 ozs.; left 1 lb. 8 ozs.

The Intestines present nothing pathological externally, but on examination of the internal surface many extravasations present themselves to view. The greater number are small in size, round and dotted over the whole length of the mucous membranes of the small intestines. Here and there patches of congestion are found, from one to two inches in length and about half that width, but there is no ulceration. No parasites.

The points of interest in this case are :—

(i). That the disease was successfully transmitted by the subcutaneous injection of 0·1c.c. of blood containing swarms of hæmatozoa at the time of inoculation.

(ii). That the period which elapsed between the subcutaneous introduction of the blood and the first appearance of the hæmatozoon in the general circulation was only four days, and yet, fluid extracted with the aid of a Pravaz syringe from the raised tumor at the seat of inoculation on the day previously, revealed the presence of the hæmatozoon in it.

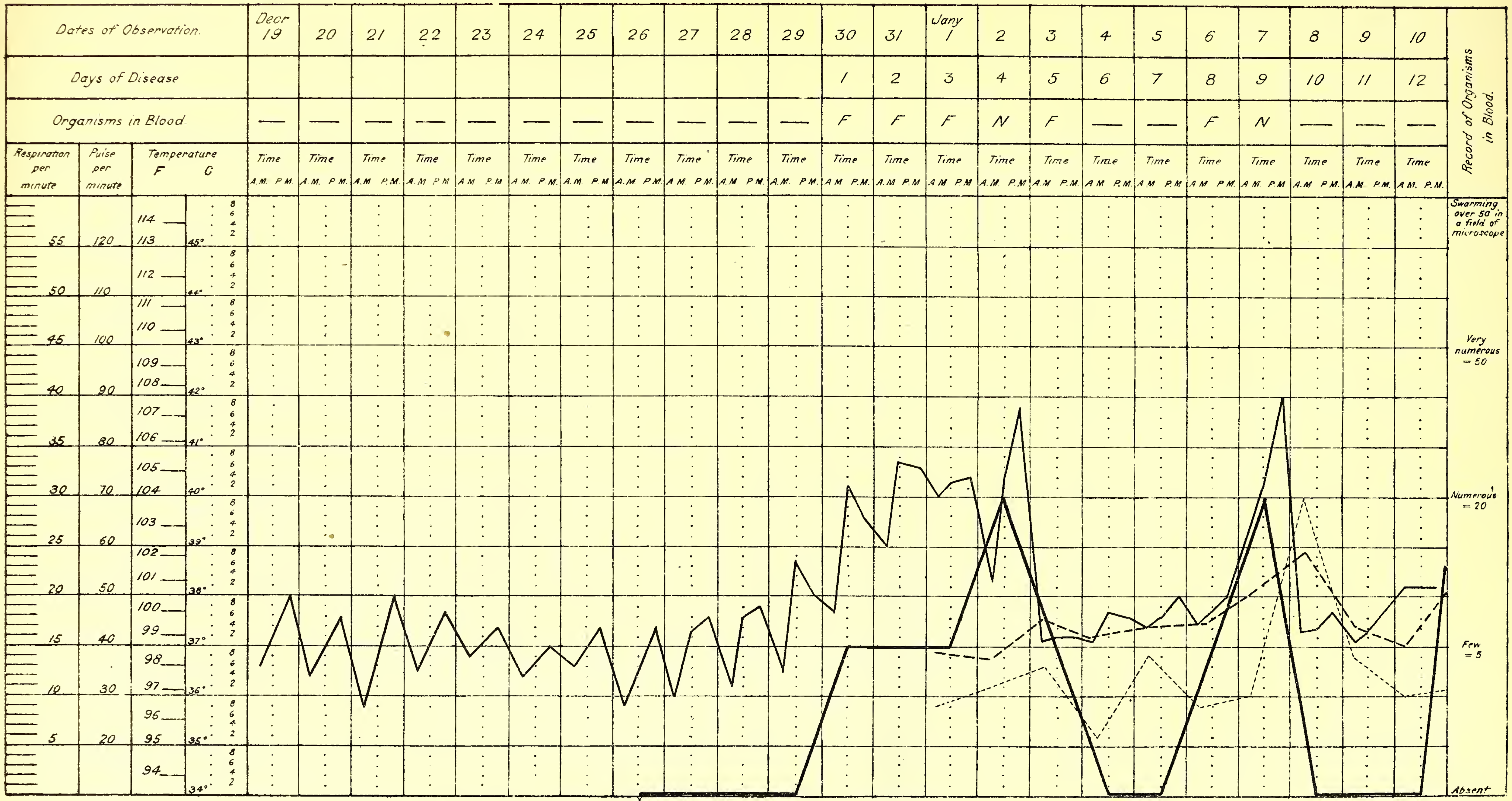
(iii). The time which elapsed between the inoculation and the death of the animal was forty-two days.

(iv). The very slight pathological lesions found at the *Post-mortem* examination.

(v). The complete absence of parasites from the intestines.

Country-bred Horse ______ Age, Aged ____ Sex, Horse ______ Colour, Chestnut

Disease, Inoculated Horse Surra ______ Date of, Inoculation 26. 12. 1891 ______ Result, Death ______ Date of Result, 6. 2. 92. ____ Register No. LIV ______



(S 415)

Hæmatozoon curve
Temperature ......

Drawn & Litho: Govt. Photozinco: Office Poona 1892.

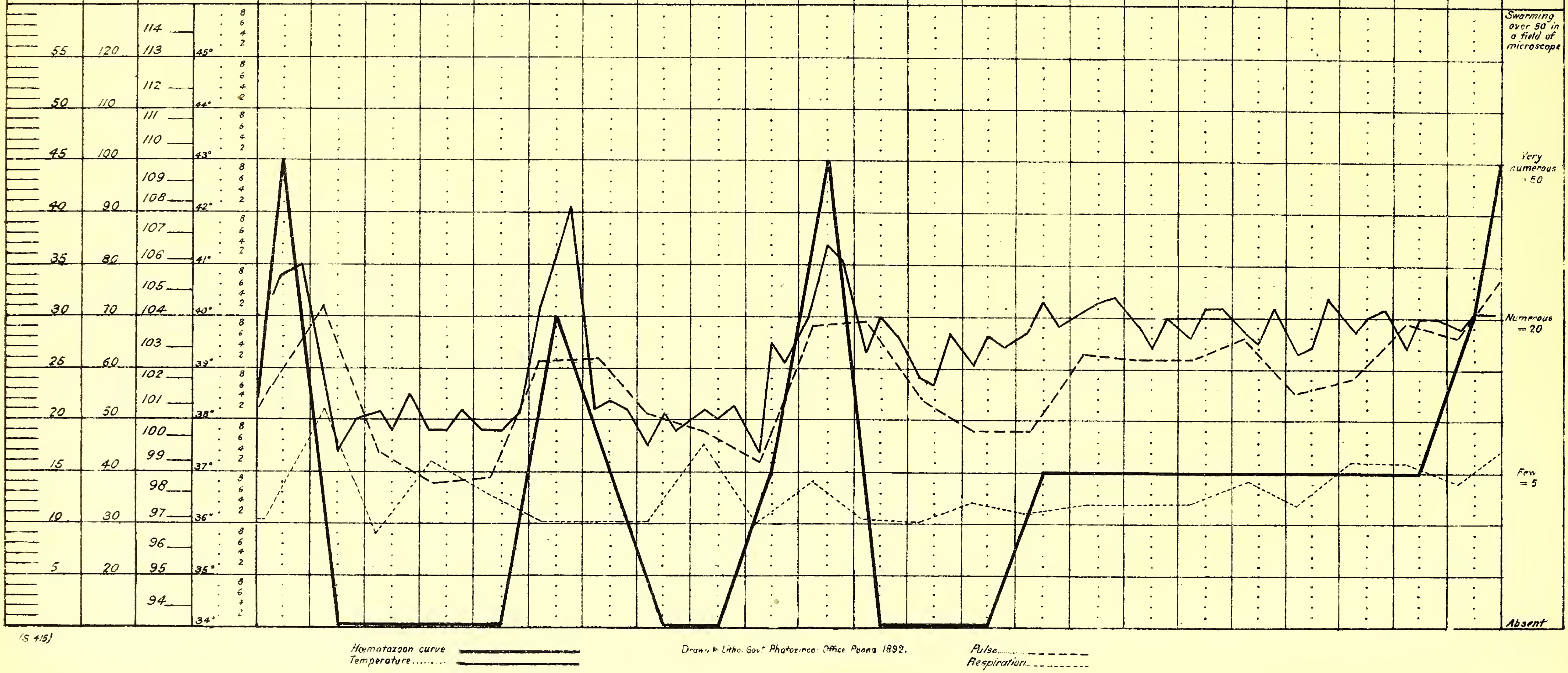
Pulse ......
Respiration ......

x Subcutaneously Inoculated with 0.1c.c. of blood taken from the Jugular Vein of Horse No. LVI containing Swarms of Hæmatozoa

Age — Sex — Colour —

Disease — Date of Attack — Result — Date of Result — Register No. LIV

Dates of Observation.	Jany 11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Feby 1	2	Record of Organisms in Blood.
Days of Disease	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	
Organisms in Blood	VN	—	—	—	—	N	F	—	—	F	VN	—	—	—	F	F	F	F	F	F	F	F	N	
Respiration per minute Pulse per minute Temperature F C	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	

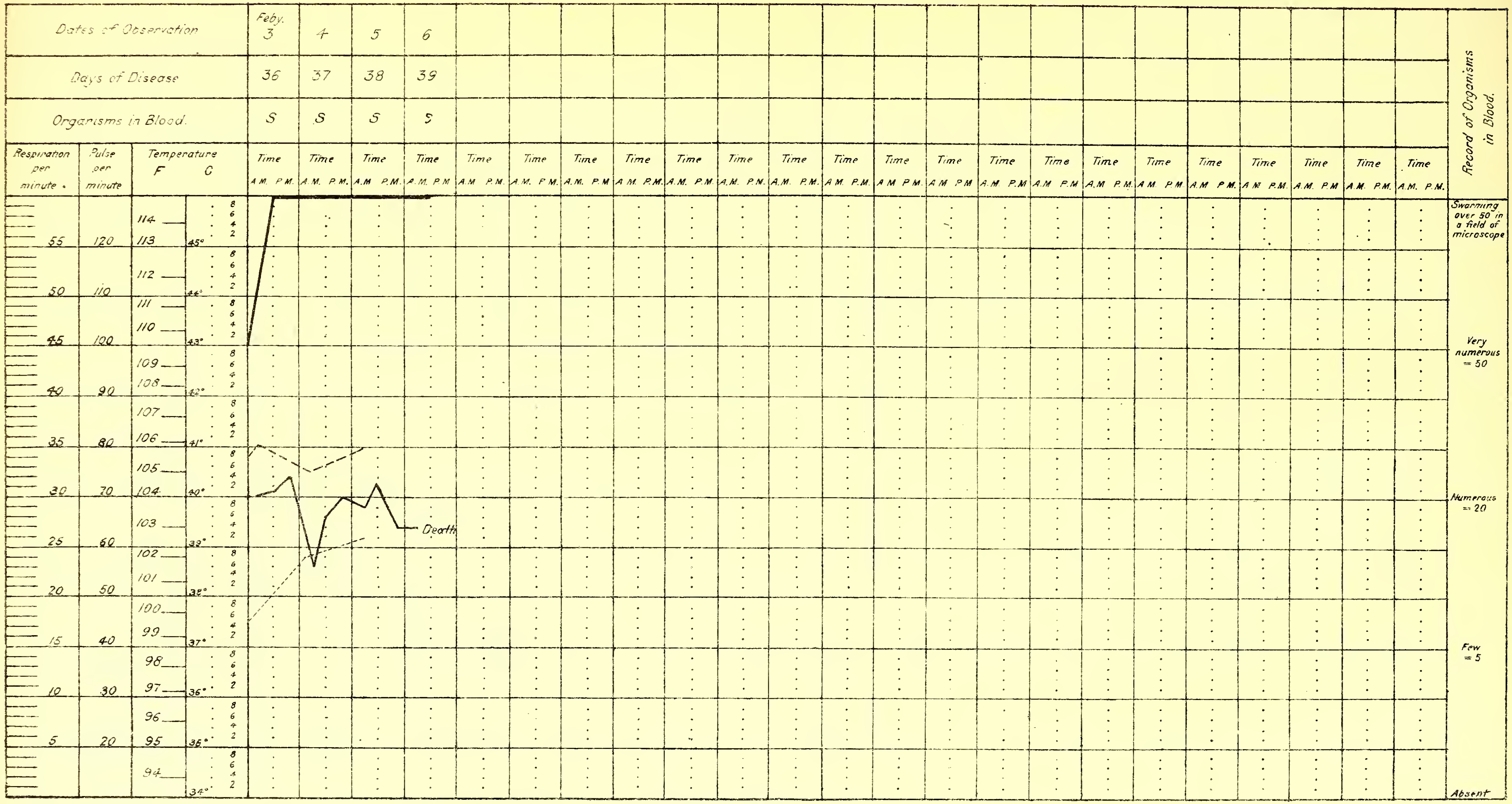


(S 415)

Drawn & Litho. Govt. Photozinco. Office Poona 1892.

Age ______ Sex ______ Colour ______

Disease ______ Date of Attack ______ Result ______ Date of Result ______ Register No. LIV



(S. 415)

Hæmatozoon curve
Temperature......

Drawn & Litho: Govt. Photozincog: Office Poona 1892.

Pulse......
Respiration......

RECORDS OF URINE.

Animal, Chestnut C. B. Horse No. LIV. Date { *Inoculated 26th December 1891.* / *Death 6th February 1892.*

Disease, Surra.

Date.	Quantity.	Colour.	Re-action.	Specific Gravity.	Albumen.	Phosphates.	REMARKS.
1891.							
December 19	......	Turbid, viscid yellow.	Alkaline	1,030	No	No	Striated spheres, and $CaCo_3$, numerous, some oxalates, &c.
27	......	Turbid, viscid orange.	Do.	1,028	No	No	,, ,,
28	......	Do. do.	Do.	1,031	No	No	,, ,,
29	......	Do. do.	Do.	1,026	No	No	,, ,,
30	......	Do. do.	Do.	1,026	No	No	,, ,,
31	......	Dirty-yellow	Do.	1,033	No	No	,, ,,
1892.							
January 1	......	Do.	Do.	1,036	No	No	,, ,,
2	......	Brownish-red	Do.	1,034	A trace.	No	,, ,,
3	......	Brownish-orange.	Do.	1,032	A trace.	No	,, ,,
4	......	Do. do.	Do.	1,022	No	No	,, ,,
5	......	Brownish bright yellow.	Do.	1,023	No	No	,, ,,
6	......	Do. do.	Do.	1,026	No	No	,, ,,
7	......	Muddy orange	Do.	1,034	No	No	,, ,,
8	......	Muddy yellow	Do.	1,030	A trace.	No	,, ,,
9	......	Muddy orange	Do.	1,025	A trace.	No	,, ,,
10	......	Yellowish-red	Do.	1,023	No	No	,, ,,
11	......	Orange	Do.	1,036	A trace.	No	,, ,,
12	......	Do.	Do.	1,027	A trace.	No	,, ,,
13	......	Yellow	Do.	1,028	NO	No	,, ,,
14	......	Do.	Do.	1,027	No	No	,, ,,
15	......	Do.	Do.	1,023	No	No	,, ,,
16	......	Muddy yellow	Do.	1,032	No	No	,, ,,
17	......	Muddy reddish-yellow.	Do.	1 036	A trace.	No	,, ,,
18	......	Yellow	Do.	1,030	No	No	,, ,,
19	......	Yellowish-red	Do.	1,026	No	No	,, ,,
20	......	Orange	Do.	1,029	No	No	,, ,,
21	......	Do.	Do.	1,033	No	No	,, ,,
22	......	Yellow	Do.	1,028	No	No	,, ,,
23	......	Orange	Do.	1,023	No	No	,, ,,
24	......	Yellow	Do.	1,027	No	No	,, ,,
25	......	Do.	Do.	1,026	No	No	,, ,,
26	......	Orange	Do.	1,021	No	No	,, ,,
27	......	Dirty-yellow	Do.	1,029	No	No	,, ,,
28	......	Yellow	Do.	1,032	No	No	,, ,,
29	......	Do.	Do.	1,028	No	No	,, ,,
30	......	Turbid, viscid orange.	Do.	1,036	Nil	Nil	,, ,,
31	......	Do.	Do.	1,028	Nil	Nil	Crystals of carbonate of calcium.
February 1	......	Turbid, viscid, muddy-yellow.	Faintly Alkaline.	1,031	Nil	Nil	No carbonates.
2	......	Slightly turbid, viscid, orange.	Faintly Acid.	1,037	Nil	Nil	,,
3	......	Clear, reddish-yellow.	Acid	1,026	Nil	Nil	,,
4	......	Clear, orange	Strongly Acid	1,028	Nil	Nil	,,
5	......	Clear	Do.	1,018	Nil	Nil	,,

CASE No. LV.—GREY, C.B. ENTIRE, *aged. In fair condition, and apparently healthy.*

1st February. 1892—Temp. A.M. 37°C. 1 P.M. 38·5°C. 5 P. M. 37·8°C.

2nd.—Temp. A.M. 36·7°C. 1 P.M. 38·3°C. 5 P.M. 38·6°C.

3rd.—Temp. A.M. 37·4°C. 1 P.M. 39·3°C. 5 P.M. 38·3°C.

4th.—Temp. A.M. 37°C. 1. P.M. 39·1°C. 5 P.M. 38·6°C.

5th.—10 A.M. Temp. 37·6°C. Inoculated subcutaneously over the left Scapular region, with 0·1c.c. of blood swarming with hæmatozoa, taken from the Jugular Vein of Horse No. LIV. Temp. 1 P.M. 39·2°C. Blood healthy. Temp. 5 P.M. 38·2°C.

6th.—The animal appears healthy, the visible mucous membranes are clear, there are no petechiæ on the conjunctivæ; the appetite is very good, and evacuations normal. Temp. A.M. 37·4°C. P. 50. R. 16. There is a small raised swelling at the seat of inoculation about 1 inch in diameter. The hæmatozoon is absent from the blood. Temp. 1 P.M. 39·4°C. Urine, turbid, greenish tinge of yellow. Sp. Gr. 1,054. Alkaline, no albumen. numerous Crystals of Carbonate and a few of Oxalates of Lime. Temp. 5 P.M. 38·4°C.

7th.—The swelling at the seat of inoculation has increased in size and there is œdema surrounding it and some tenderness on manipulation. Temp. A.M. 37·7°C. P. 48. R. 16. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·2°C. Urine, turbid, yellow in colour. Sp. Gr. 1,048. Alkaline, no albumen, numerous crystals. Temp. 5 P.M. 38·1°C.

8th.—The general condition of the animal continues the same, feeding well, excretions healthy in character. The swelling and œdema at the seat of the inoculation are still more increased in extent; and the tumor presents considerable tension. There are no petechiæ on the conjunctival membranes. Temp. A.M. 37·7°C. P. 56. R. 18. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·5°C. Urine, turbid, orange in colour. Sp. Gr. 1,036. Alkaline, no albumen, numerous crystals of Carbonate and a few Oxalates of Calcium. Temp. 5 P.M. 38°C.

9th.—The condition of the animal remains unchanged. The swelling and œdema at the seat of inoculation remain the same as yesterday. Temp. A.M. 37·6°C. P. 51. R. 16. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·2°C. Urine, turbid, orange in colour. Sp. Gr. 1,038. Alkaline, no albumen, crystals as before. Temp. 5 P.M. 38·3°C.

10th.—The swelling and œdema remain the same, but are very tender on manipulation. No petechiæ on the conjunctival membranes; the animal feeds well and the excretions are normal. Temp. A.M. 37·4°C. P. 51. R. 12. The hæmatozoon is absent from the blood, and the blood appears healthy. Temp. 1 P.M. 40°C. The urine is turbid, orange in colour. Sp. Gr. 1,032. Alkaline, no albumen, crystals of Calcium Carbonate very numerous. Temp. 5 P.M. 39·4°C.

11th.—The animal appears slightly dull, but otherwise healthy. The tension and tenderness of the tumor at the seat of inoculation has certainly decreased since yesterday. Temp. A.M. 39·4°C. P. 51. R. 12. Hæmatozoa few in the blood. Temp. 1 P.M. 40·2°C. The urine is turbid, of a yellow colour. Sp. Gr. 1,030. Alkaline, no albumen, crystals of Carbonate and a few of Oxalate of Calcium. Temp. 5 P.M. 40·7°C.

12th.—The animal still continues dull, but feeds well. The visible mucous membranes are unchanged, except that there are a few small petechiæ, dark red in colour, dotted over the lower portion of the membrana nictitans of each eye. Temp. A.M. 40°C. P. 60. R. 16. The hæmatozoa are numerous in the blood. Temp. 1 P.M. 40°C. Urine, turbid, yellow in colour. Sp. Gr. 1,028. Alkaline, no albumen, numerous crystals as yesterday. Temp. 5 P.M. 40°C.

13th.—The swelling and œdema at the seat of inoculation is considerably reduced in extent, and there is no tenderness on manipulation; the petechiæ—are increased in number and size and there is some slight swelling of the extremities more especially about the fetlocks. Temp. A.M. 39·2°C. P. 60. R. 12. The hæmatozoa are swarming in the blood. Temp. 1 P.M. 39·8°C. Urine, turbid, yellowish-red in colour. Sp. Gr. 1,036. Alkaline, no albumen, crystals of Calcium Carbonate. Temp. 5 P.M. 41°C.

14th.—The animal continues to be dull and somewhat sleepy, and the appetite is, perhaps, not so good as it was. The excretions are healthy in character. Temp. A.M. 40·1°C. P. 60. R. 14. The hæmatozoa continue swarming in the blood. Temp. 1 P.M. 40·4°C. Urine, turbid, orange in colour. Sp. Gr. 1,042. Alkaline, no albumen, crystals of Carbonate of Lime. Temp. 5 P.M. 40·8°C.

15th.—The general condition of the animal is unchanged. Temp. A.M. 40°C. P. 62. R. 14. The hæmatozoa are still swarming in the blood. Temp. 1 P.M. 40·6°C. Urine, turbid, yellow in colour. Sp. Gr. 1,038. Alkaline, albumen a trace; crystals of Calcium Carbonate. Temp. 5 P.M. 41·6°C.

16th.—The animal continues dull, the visible mucous membranes are tinged a yellow colour; the limbs are considerably swollen and œdematous, but they are neither hot nor painful on manipulation. The appetite remains good, and the fæces healthy. Temp. A.M. 39·3°C. P. 48. R. 16. The hæmatozoon is absent from the blood. Temp. 1. P.M. 38·2°C. Urine, turbid, yellowish-brown in colour, with a considerable sediment. Sp. Gr. 1,036. Alkaline, a trace of albumen, Carbonates and a few Oxalates. Temp. 5 P.M. 39·4°C.

17th.—The general condition of the animal appears to be unchanged. The pulse on examination is found to intermit every fourth for a period of 2 seconds. Temp. A.M. 38·1°C. P. 51. R. 16. The hæmatozoa are few in the blood. Temp. 1 P.M. 38·2°C. Urine, turbid, amber with heavy sediment. Sp. Gr. 1,042. Alkaline, a trace of albumen crystals of Calcium Carbonate, and a few Oxalates. Temp. 5 P.M. 38·8°C.

18th.—Condition unchanged. Temp. A.M. 38·2°C. P. 60. R. 18. Hæmatozoa are few in the blood. Temp. 1 P.M. 39·1°C. Urine, turbid, reddish-yellow in colour. Sp. Gr. 1,041. Alkaline, a trace of albumen. Temp. 5 P.M. 39·5°C.

19th.—The animal is rather duller this morning, the pulse is stronger but hard, and not intermittent. Temp. A.M. 40°C. P. 60. R. 20. Hæmatozoa are swarming in the blood. Temp. 1 P.M. 41·4°C. Urine, turbid, reddish-yellow. Sp. Gr. 1,033. Alkaline, a trace of albumen, crystals numerous. Temp. 5 P.M. 42°C.

20th.—The animal appears brighter, but the œdema of the limbs has increased in amount, and there is some swelling of the sheath. Temp. A.M. 39·6°C. P. 60. R. 30. Hæmatozoa few in the blood. Temp. 1 P.M. 39·4°C. Urine, turbid, orange in colour. Sp. Gr. 1,038. Alkaline, a trace of albumen. Temp. 5 P.M. 38·2°C.

21st.—Condition the same as yesterday. The pulse remains hard. Temp. A.M. 37·5°C. P. 54. R. 17. Hæmatozoa few in the blood. Temp. 1 P.M. 39°C. Urine, turbid viscid orange in colour. Sp. Gr. 1,037. Alkaline, a mere trace of albumen. Temp. 5 P.M. 38·8°C.

22nd.—There is no change in the general condition. Temp. A.M. 37·8°C. P. 48. R. 16. Hæmatozoa few in the blood. Temp. 1 P.M. 39·8°C. Urine, turbid, viscid yellowish-red in colour. Sp. Gr. 1026. Alkaline, the merest trace of albumen. Temp. 5 P.M. 40·2°C.

23rd.—Condition unchanged. Temp. A.M. 38·8°C. P. 64. R. 17. Hæmatozoa are few in the blood. Temp. 1 P.M. 39·6°C. Urine, turbid, viscid, orange in colour. Sp. Gr. 1,029. Alkaline, the merest trace of albumen. Temp. P.M. 39·1°C.

24th.—The animal is very dull this morning and weaker; there are numerous petechiæ on the conjunctival membranes, but the nasal ones are perfectly free from any extravasations. Temp. A.M. 38·2°C. P. 60. R. 60. Hæmatozoa are very numerous in the blood. Temp. 1 P.M. 39·4°C. Urine, turbid, viscid, orange in colour. Sp. Gr. 1,035. Alkaline, a mere trace of albumen; crystals of Calcium Carbonate and a few Oxalates. Temp. 5 P.M. 39·7°C.

25th.—The animal continues dull, but the appetite is good, and the fæces natural in character. Temp. A.M 40·1°C. P. 78. R. 20 Hæmatozoa swarming in the blood. Temp. 1 P.M 41·3°C. Urine, turbid, viscid, dirty-orange in colour. Sp. Gr. 1,031. Alkaline, a mere trace of albumen. Temp. 5 P.M. 41·7°C.

26th.—The animal is dull and sleepy; holds its head down, and the eyes are partially closed, but every now and then appears to brighten up, and goes on feeding. Pulse full and hard. Temp. A.M. 39·4°C. P. 72. R. 36. Hæmatozoa few in the blood. Temp. 1 P.M. 39·6°C. Urine, turbid, viscid. Sp. Gr. 1,028. Alkaline, albumen a trace; crystals of Calcium Carbonate. Temp. 5 P.M. 39·2°C.

27th.—The condition of the animal is better this morning, and it is brighter, and the appetite is good. The swelling and œdema of the extremities is about the same. Temp. A.M. 38°C. P. 60. R. 20. The hæmatozoon is absent from the blood. Temp. 1 P.M. 39·2°C. Urine, turbid, viscid, dirty-orange in colour. Sp. Gr. 1,033. Alkaline, a trace of albumen. Temp. 5 P.M. 39·8°C.

28th.—The animal continues brighter; the conjunctival membranes are free from petechiæ, but there is still a tinge of yellow, visible on the other membranes. Temp. A.M. 37·8°C. P. 65. R. 24. The hæmatozoon is absent from the blood. Temp. 1 P.M. 38·6°C. Urine, turbid, viscid, muddy-orange in colour. Sp. Gr. 1,027. Alkaline, a trace of albumen, numerous crystals of Carbonate of Calcium. Temp. 5 P.M. 38·8°C.

29th.—The condition of the animal is unchanged. Temp. A.M. 37·7°C. P. 62. R. 30. The hæmatozoon is absent from the blood. Temp. 1 P.M. 39·3°C. Urine, turbid, viscid, muddy-yellowish-red. Sp. Gr. 1,032. Alkaline, a trace of albumen. Temp. 5 P.M. 39·5°C.

1st March.—The condition of the animal is unchanged. Temp. A.M. 39·3°C. P. 60. R. 20. The hæmatozoon is absent from the blood. Temp. 1 P.M. 40·1°C. Urine, turbid, viscid, orange in colour. Sp. Gr. 1,029. Alkaline, a trace of albumen. Temp. 5 P.M. 40·5°C.

2nd.—The animal is losing flesh, it has been so gradual as to be hardly perceptible, but nevertheless progressive; the extremities are becoming much more swollen and œdematous. Temp. A.M. 39·4°C. P. 68. R. 22. The hæmatozoa are very numerous in the blood. Temp. 1 P.M. 40·5°C. Urine, turbid, viscid, orange in colour. Sp. Gr. 1,037. Alkaline, a trace of albumen, and numerous crystals of Carbonate and a few crystals of Oxalate of Calcium. Temp. 5 P.M. 40·6°C.

3rd.—The general condition of the animal remains unchanged. Temp. A.M. 40°C. P. 80. R. 36. The hæmatozoa are swarming in the blood. Temp. 1 P.M. 40·4°C. Urine, turbid, viscid, orange in colour. Sp. Gr. 1,025. Alkaline, a trace of albumen, crystals of Calcium Carbonate. Temp. 5 P.M. 40·4°C.

4th.—The animal is getting weaker, and the swelling and œdema is spreading along the under-surface of the abdomen. There are numerous petechiæ on the conjunctival membranes, and the yellow tinge of the visible mucous membranes has now become a darker shade of the same colour. Temp. A.M. 39·3°C. P. 80. R. 36. The hæmatozoa continue to swarm in the blood. Temp. 1 P.M. 40·3°C. Urine, turbid, slight viscid, orange in colour. Sp. Gr. 1,024. Neutral in re-action, a mere trace of albumen, no crystals of Carbonate of Lime. Temp. 5 P.M. 40·5°C.

5th.—This morning the animal is somewhat off its feed, and there is difficulty in eating gram. Temp. A.M. 38·4°C. P. 84. R. 36. The hæmatozoa are very numerous in the blood. Temp. 1 P.M. 40·4°C. Urine, much less turbid, orange in colour. Sp. Gr. 1,024. Acid, a mere trace of albumen, no Carbonates. Temp. 5 P.M. 41·3°C.

6th.—The condition of the animal is unchanged. Temp. A.M. 39·3°C. P. 72. R. 36. The hæmatozoa are few in the blood. Temp. 1 P.M. 40°C. Urine, clear, orange. Sp. Gr. 1,021. Acid, a mere trace of albumen, no Carbonates. Temp. 5 P.M. 41·3°C.

7th.—The animal is much weaker, and the swelling and œdema on the under-surface of the abdomen now extends between the fore-limbs. Temp A.M. 39·3°C. P. 84. R. 24. The hæmatozoa are few in the blood. Temp. 1 P.M. 40·1°C. Urine, clear, orange in colour. Sp. Gr. 1,020. Strongly acid, no albumen, no Carbonates. Temp. 5 P.M. 40·4°C.

8th.—Condition unchanged. Temp. A.M. 38·7°C. P. 80. R. 24. Hæmatozoa are few in the blood. Temp. 1 P.M. 40°C. Urine, clear, orange in colour. Sp. Gr. 1,018. Strongly acid. Temp. 5 P.M. 40·6°C.

9th.—The animal is gradually becoming weaker and the appetite is poor. Temp. A.M. 38·5°C. P. 104. R. 36. Hæmatozoa are swarming in the blood. Temp. 1 P.M. 38·2°C. Urine, clear-orange in colour. Sp. Gr. 1,015. Strongly acid, no Carbonates. Temp 5 P.M. 38·3°C.

10th.—The animal fell in the early morning and death took place at 8 A.M.

AUTOPSY made half an hour after death.

The body is emaciated and the limbs swollen and the seat of semi-solid œdema.

There is no fluid in the pleural cavities or adhesions of the pleuræ.

Lungs, Right.—Considerable hypostatic congestion due to the animal's position for some hours previous to death. The organ is otherwise free from pathological changes.

Left lung.—Pale in colour; there are several small nodules lying directly under the pleura; *on section,* they present a yellow colour and are calcareous in nature. The organ is fully distended with air and the tissues appear healthy.

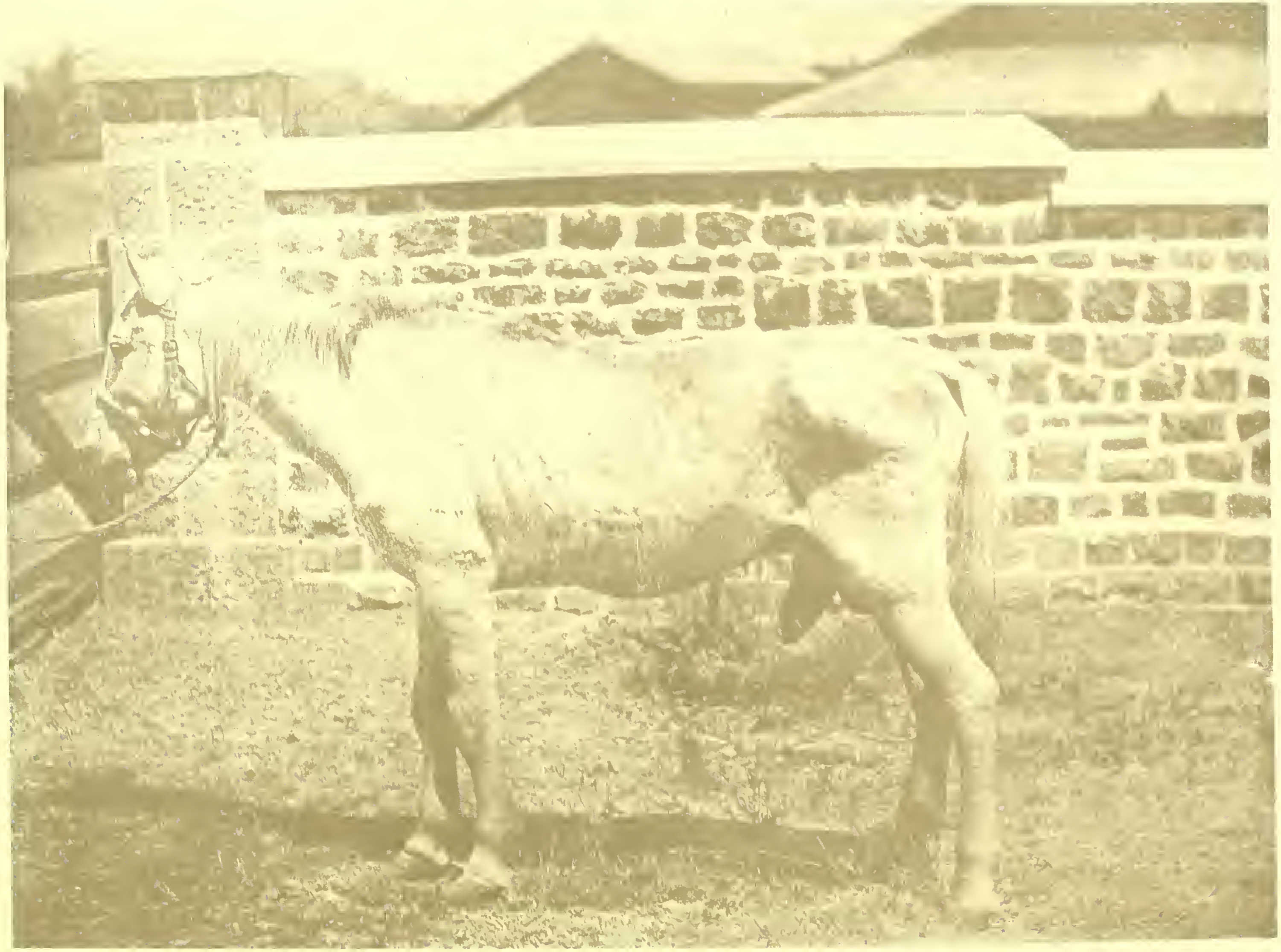
The *Pericardium* is free from extravasations of blood, but the sac contains several ounces of a clear-orange coloured fluid.

Heart.—Weighs 5 lbs. 10 ozs. Around the large vessels at the base of the heart, a considerable amount of lemon-coloured exudation is present but it does not as in previous cases run down the coronary grooves on either side of the anterior and posterior coronary vessels. There are no extravasations of blood on the external aspect of the heart, but the tissues are somewhat pale in colour. *On section* the *right auricle* is apparently healthy. *Right ventricle* is also healthy with the exception of a slight thickening of the endocardial lining. The valves are normal. The *left ventricle* presents a few small, circular, dark-coloured ecchymoses lying under the endocardium. The *left auricle* also presents a slight thickening of the endocardium, but there are no extravasations and the valves are normal.

Stomach.—*On section,* contains some semi-digested food—presents a perfectly normal condition of the cuticular and villous portions. There are no bots or worms present in its cavity.

The Liver.—Weighs 12 lbs. 5 ozs. and is of a dark chocolate colour, and is quite free from any calcareous bodies or pathological change as far as can be observed.

Spleen.—Weighs 2 lbs. 10 ozs. Is dark in colour, firm in consistency, and with the exception of a few small, irregular shaped and superficial ecchymoses appeared healthy.

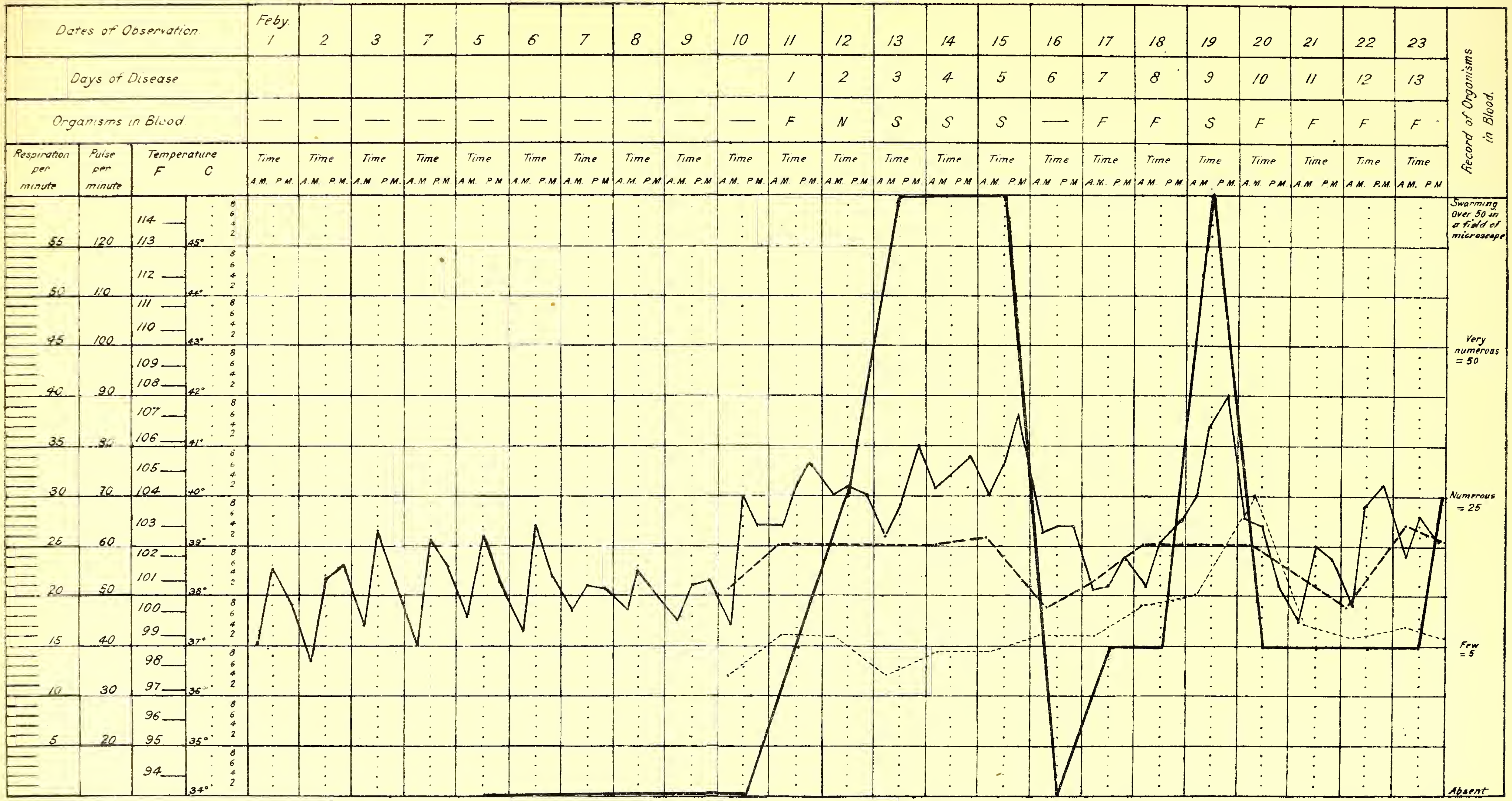


HORSE NO. LV.

PHOTOGRAPHED ON THE 3RD MARCH 1892 (22ND DAY OF THE DISEASE). SURRA HÆMATOZOA SWARMING IN THE BLOOD AT THE TIME.

Country bred horse ______ Age aged ____ Sex, Entire ______ Colour, Grey. ______

Disease, Inoculated Horse Surra ______ Date of Inoc. May 2nd 1892. ______ Result, death ______ Date of Result 10-3-92 ____ Register No. LV ______



(S. 415)

Hæmatozoon Curve. ————

Pulse.................. – – – – – –

Temperature ————

Respiration - - - - - - - - - -

x

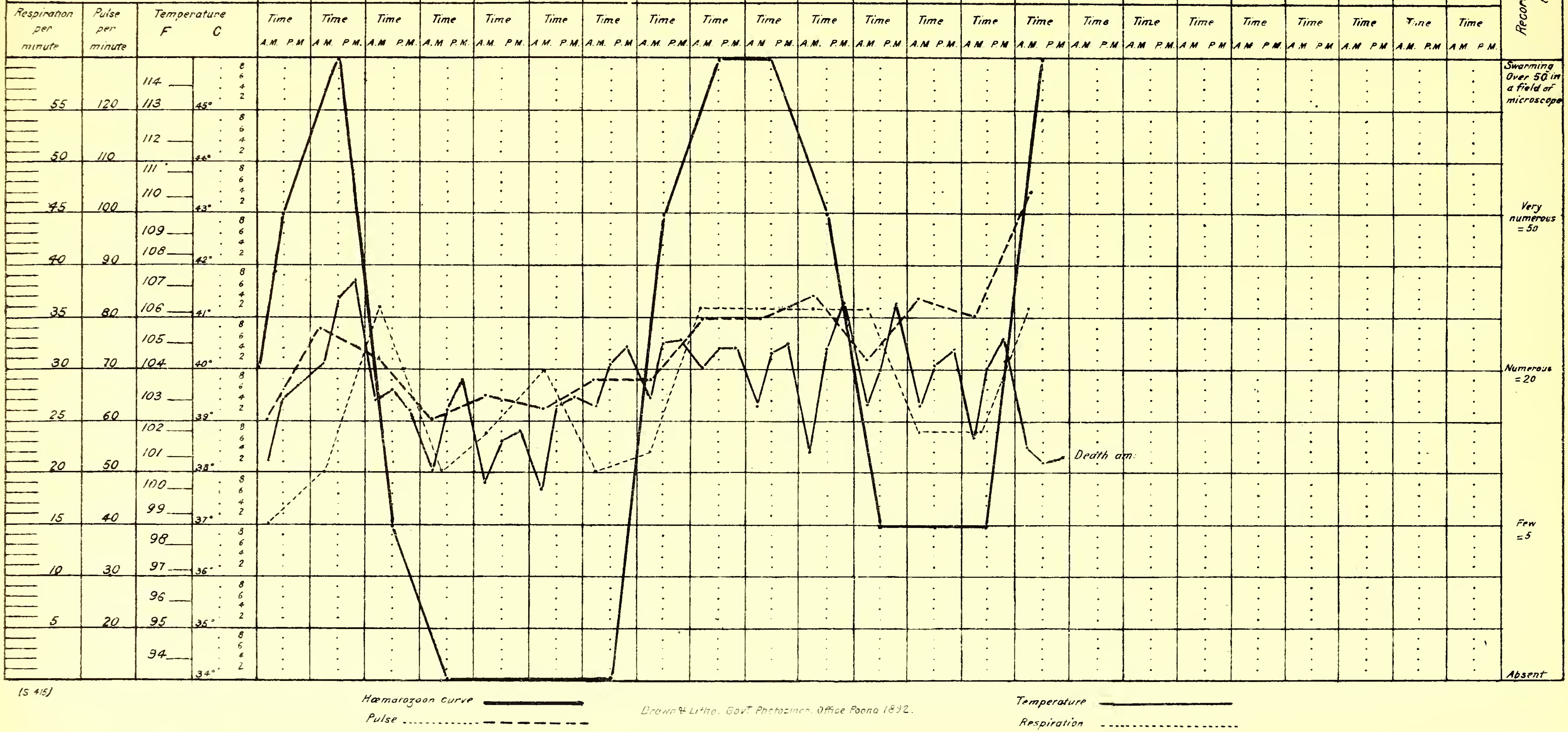
Drawn & Litho: Govt. Photozinco. Office, Poona 1892.

x Subcutaneously inoculated with 0.1 c c of blood containing swarms of Hæmatozoa, taken from the jugular Vein of Horse No LIV.

Age ______ Sex ______ Colour ______

Disease ______ Date of Attack ______ Result ______ Date of Result ______ Register No. LV ______

Dates of Observation.	Feby. 24	25	26	27	28	29	Mar. 1	2	3	4	5	6	7	8	9	10								
Days of Disease	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29								
Organisms in Blood	VN	S	F	—	—	—	—	VN	S	S	VN	F	F	F	S									



(S 415)

Drawn & Litho. Govt. Photozinco. Office Poona 1892.

Kidneys.—Right weighs 1 lb. 2 ozs. Left weighs 1 lb. 2½ ozs. The capsules strip easily, there are no extravasations or ecchymoses visible on the external aspect or on section.

The Intestines externally are free from any change and *on section* the mucous membranes appear healthy. There are no parasites present.

The points of interest in this case are:—

(i). The successful transmission of the disease by subcutaneous injection of ·1c.c. of blood containing swarms of hæmatozoa at the time of inoculation.

(ii). Incubation.—The period which elapsed between the subcutaneous inoculation of the blood and the first appearance of the hæmatozoon in the blood—was seven days.

(iii). The time which elapsed between the inoculation and death was thirty-six days.

(iv). The very slight pathological lesions found at the *Post-mortem* examination.

CASE No. XXIV.—BROWN, C.B. MARE, *aged, in fair condition and healthy.*

14th June 1891.—Temp. P.M. 36·5°C.

15th.—Temp. A.M. 36·1°C. P.M. 37·4°C. A short incision was made in the white skin of the muzzle ¼th inch in length and just through the cuticle so as not to cause any bleeding. A drop of blood was taken from Horse No. XXII in which very numerous hæmatozoa were present and a small quantity, the fraction of a minim, of it was immediately placed between the edges of the incision.

16th.—There is no change noticeable at the point of inoculation. Temp. A.M. 36·8°C. There are no hæmatozoa in the blood. Temp. P.M. 37·8°C.

17th.—The condition is unchanged. Temp. A.M. 37·5°C. No hæmatozoa in the blood. Temp. P.M. 37·9°C.

18th.—There is a pink flush surrounding the line of incision at the point of inoculation for ⅓rd of an inch, accompanied by some induration. Temp. A.M. 37·6°C. No hæmatozoa in the blood. Temp. P.M. 37·8°C.

19th.—There are several petechiæ on the conjunctival membranes of both eyes, more especially in the left eye. Temp. A.M. 37·7°C. There are no hæmatozoa in the blood. Temp. P.M. 38·3°C.

20th.—The induration on the muzzle, at the seat of inoculation, has slightly increased in dimensions and there is some enlargement of the glands behind the angle of the jaw. Temp. A.M. 37·8°C. There are no hæmatozoa in the blood. Temp. P.M. 38·3°C.

21st.—The animal appears bright and in good health. The appetite is good and the evacuations natural. The induration at the seat of inoculation has increased. Temp. A.M. 37·8°C. There are no hæmatozoa in the blood. Temp. P.M. 38·3°C.

22nd.—This morning the induration at the seat of inoculation is certainly less pronounced, and on examination of the blood a few hæmatozoa were discovered. Temp. A.M. 37·8°C. Temp. P.M. 39·5°C.

23rd.—Condition unchanged. Temp. A.M. 38·8°C. The hæmatozoa are very numerous in the blood. Temp. P.M. 39·3°C.

24th.—Condition of the animal is unchanged. The swelling and induration are still appreciable, but are much reduced in volume. Temp. A.M. 39·2°C. There are very numerous hæmatozoa in the blood. Temp. P.M. 40·2°C.

25th.—The condition of the animal appears to be unchanged. All the pink flush bordering the line of incision, and the induration have disappeared from the seat of inoculation. The sub-maxillary glands still remain enlarged. Temp. A.M. 38·7°C. The hæmatozoa are very numerous in the blood. Temp. P.M. 38·3°C.

26th.—Condition unchanged. Temp. A.M. 38·5°C. Hæmatozoa very numerous in the blood. Temp. P.M. 39·7°C.

27th.—Condition unchanged. Temp. A.M. 38·1°C. Hæmatozoa very numerous in the blood. Temp. P.M. 40·5°C.

28th.—Condition unchanged. Temp. A.M. 38·8°C. The hæmatozoa are few in the blood. Temp. P.M. 40·4°C.

29th.—Condition unchanged. Temp. A.M. 37·8°C. The hæmatozoa are numerous in the blood. Temp. P.M. 40·4°C.

30th.—Condition unchanged. Temp. A.M. 39·5°C. P.M. 38·2°C. Hæmatozoa very numerous.

1st July.—Condition unchanged. Temp. A.M. 37·8°C. P.M. 38·3°C. Hæmatozoa very numerous.

2nd.—Condition unchanged. Temp. A.M. 38°C. P.M. 38·2°C. Hæmatozoa very numerous.

3rd.—Condition unchanged. Temp. A.M. 38·1°C. P.M. 38·5°C. Hæmatozoa very numerous.

4th.—Condition unchanged. Temp. A.M. 37·6°C. P.M. 38·7°C. Hæmatozoa very numerous.

5th.—Condition unchanged. Temp. A.M. 38·1°C. P.M. 38·5°C. Hæmatozoa very numerous.

6th.—This morning at 6 A.M. the syce found a small quantity of blood and pus flowing from the nostrils, and the animal in a weak condition. There is some swelling and œdema on the under-surface of the abdomen, but the extremities are free. The appetite is poor, but the evacuations are normal in character. The animal became very much weaker during the day and fell at 11-30 A.M. Death took place at 12-45 P.M.

AUTOPSY at 1-30 P.M., ¾th of an hour after death.—The body is considerably emaciated

Thorax.—There is no fluid in the pleural cavities or adhesions of the pleuræ.

Lungs are the seat of considerable emphysema, especially at the apices and along the free borders. There are a few circular extravasations of blood dotted over the surfaces of the organs, and *on section* the tissues present a yellowish-red colour. They are otherwise healthy.

Heart.—There are two ounces of an amber-coloured fluid in the pericardial sac which contains a few hæmatozoa. There is a collection of yellow-coloured exudation round the base of the organ, and a few small irregular shaped ecchymoses dotted over the muscular walls.

On section.—The *right auricle* is fully distended with blood clots but there are no sub-endocardial extravasations. The *right ventricle* contains some dark-coloured clot, bathed in fluid blood. There are a few small extravasations lying beneath the endocardium, but the auriculo-ventricular valves are not involved. The *left auricle* is distended with clot, and is healthy. The *left ventricle* is contracted and contains a small amount of clot, the walls are hypertrophied and have undergone a fatty change, and there are a few extravasations under the endocardial lining. Valves free and normal.

Liver is large, dark in colour and presents peri-hepatitis of old standing. There are a few round, yellowish-green coloured spots on the surface of the organ, which *on section* are found to have thick calcareous walls, and the centre of them is made up of caseous material. *On section* of the organ, dark-coloured fluid blood exudes freely from the cut surfaces, and a few yellow concretions are observed encapsuled in the substance of the tissues.

Stomach is somewhat distended, but externally presents nothing abnormal. *On section* it is found to contain a certain amount of semi-digested food, exceedingly offensive in smell. The *cuticular* portion appears healthy. The *villous* portion presents a patch reddish in colour lying midway between the line of demarcation and the pylorus. There is no ulceration.

Spleen is somewhat enlarged and weighs 3 lbs. 9 ozs. There are a few ecchymoses, dark in colour on the convex surface. *On section* the tissues are firm and healthy.

Kidneys.—Right weighs 1 lb. 9 ozs. Left 1 lb. 13½ ozs. Both organs were found to be lying in a bed of yellow jelly-like exudation. The capsules strip off easily, and present patches of injected stellate veins. *On section* the organs are pale, but appear healthy to the naked eye.

The large and small intestines present nothing pathological.

Brain.—On removal of the skull cap, the membranes present a pale appearance. The veins on the surface of the hemispheres are distended with dark fluid blood; *on section*, the brain tissue is pale in colour, dotted over with small specks of blood. The lateral ventricles are distended with fluid, slightly opalescent in colour.

Nasal fossæ.—On removal of the anterior bony wall covering in the nasal fossæ. The mucous membrane lining the cavity, and covering the turbinated bones, presents a dark-purple colour due to intense congestion, and at a very short distance appears perfectly black. No ulceration was found after careful examination.

Remarks.—The points of interest in this case are :—

(i). That the disease can be conveyed by placing a relatively minute quantity of blood containing the hæmatozoon into an incision involving the cuticle only without blood being drawn.

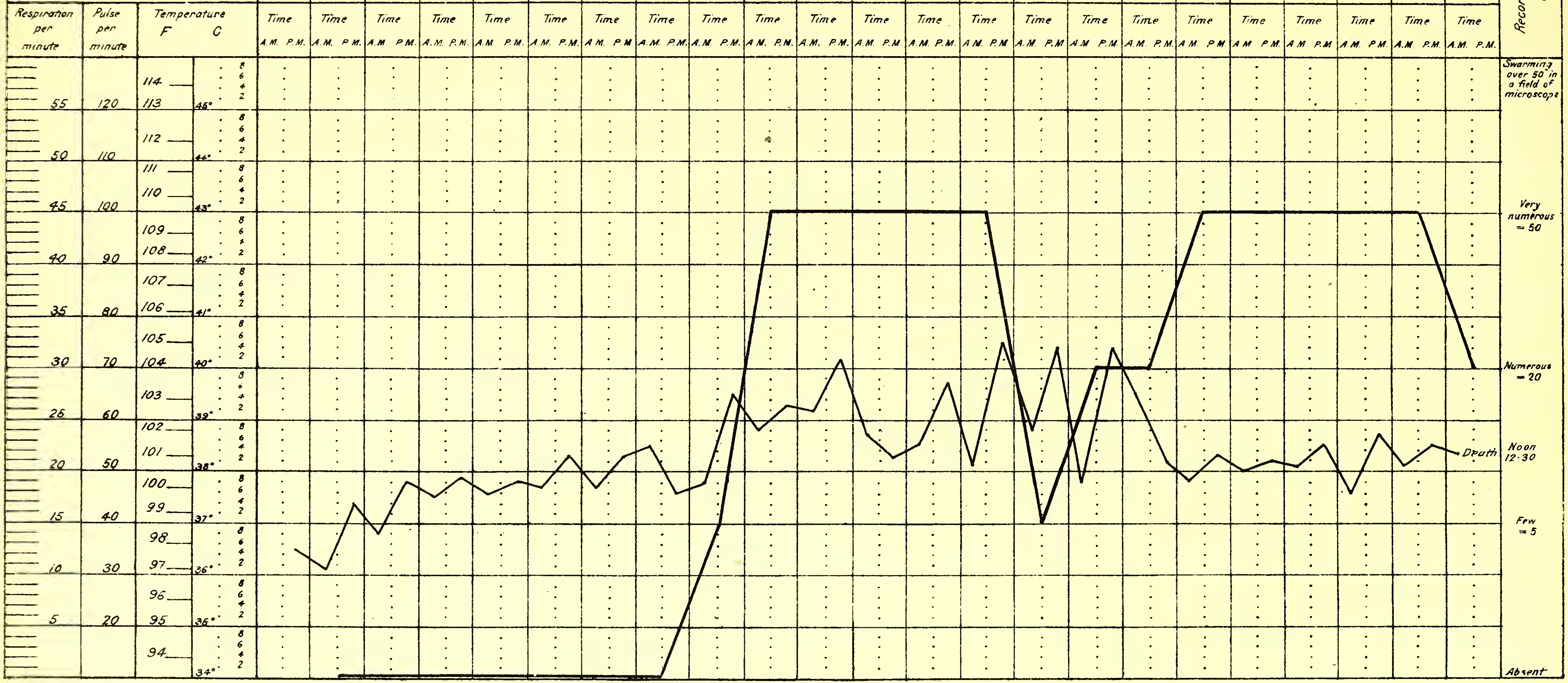
(ii). That swelling and induration followed at the seat of the incision exactly as in the case, when the inoculation was made subcutaneously.

(iii). As might be expected from the position selected for the inoculation, extensive pathological changes occurred about the head, as evidenced by the condition of the mucous membranes covering the turbinated bones and the enlargement of the sub-maxillary glands.

(iv.) Although only a fraction of a drop of blood was used for the purpose of inoculation, the period of incubation, namely, the time which elapsed between the inoculation and the first appearance of the hæmatozoon in the blood, was only seven days. This period has been exceeded in horses which have received 1 c.c. of Surra blood subcutaneously.

Disease, 'Surra' Inoculated. Date of Inoculation, 15.6.1891. Result, Death. Date of Result, 6.7.91. Register No. XXIV.

Dates of Observation.	June 14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	July 1	2	3	4	5	6
Days of Disease									1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Organisms in Blood.	—	—	—	—	—	—	—	—	F	VN	VN	VN	VN	VN	F	N	N	VN	VN	VN	VN	VN	N



(S. 415)

Hæmatozoon curve
Temperature ......

Drawn & Litho: Govt. Photozinco: Office Poona 1892.

× A fraction of a minim containing very numerous hæmatozoa was placed between the edges of an incision of the cuticle on the muzzle, without drawing blood. The blood was taken from Horse No. XXII.

APPENDIX V.

EXPERIMENTAL CASES.

SUBCUTANEOUS INOCULATION WITH POST-MORTEM BLOOD.

HORSES Nos. XVIII, XIX, XXVII, XXIII, XI, XXXII, VII.

CASE No. XVIII.—CHESTNUT COUNTRY-BRED HORSE, *aged, in fair condition and healthy.*

6th March, 1891.—Temp. A.M. 38·1°C. Blood healthy. Temp. P.M. 37·0°C.

7th.—Temp. A.M. 36·2°C. Blood healthy. Temp. P.M. 37·3°C.

8th.—Temp. A.M. 37°C. Blood healthy. Temp. P.M. 37·4°C.

9th.—Temp. A.M. 37·3°C. Blood healthy. Temp. P.M. 37·5°C.

10th.—Temp. A.M. 36·8°C. Blood healthy. Temp. P.M. 36·9°C.

11th.—Temp. A.M. 37°C. Blood healthy. Temp. P.M. 37·2°C.

12th.—Temp. A.M. 36·3°C. Noon—Inoculated subcutaneously on either side of the neck with 1·0c.c. of blood from Horse No. XV taken from the heart, 10 hours after death (on microscopical examination of the injected blood, no hæmatozoa were observed). Temp. P.M. 36·8°C.

13th.—Temp. A.M. 37·1°C. No hæmatozoa in the blood. Temp. P.M. 37·4°C.

14th.—Temp. A.M. 37·5°C. No hæmatozoa in the blood. Temp. P.M. 37·7°C.

15th.—Temp. A.M. 37·2°C. No hæmatozoa in the blood. Temp. P.M. 37·6°C.

16th.—Temp. A.M. 37·5°C. No hæmatozoa in the blood. Temp. P.M. 37·6°C.

17th.—Temp. A.M. 37·4°C. No hæmatozoa in the blood. Temp. P.M. 37·7°C.

18th.—Temp. A.M. 37·1°C. No hæmatozoa in the blood. Temp. P.M. 37·4°C.

19th.—Temp. A.M. 37·6°C. No hæmatozoa in the blood. Temp. P.M. 37·8°C.

20th.—Temp. A.M. 37·5°C. No hæmatozoa in the blood. Temp. P.M. 37·7°C.

21st.—Temp. A.M. 37°C. No hæmatozoa in the blood. Temp. P.M. 37·3°C.

22nd.—Temp. A.M. 37·4°C. No hæmatozoa in the blood. Temp. P.M. 37·6°C.

23rd.—Temp. A.M. 37·1°C. No hæmatozoa in the blood. Temp. P.M. 37·3°C.

24th.—Temp. A.M. 37·4°C. No hæmatozoa in the blood. Temp. P.M. 37·6°C.

25th.—Temp. A.M. 38·6°C. Hæmatozoa numerous in the blood. Temp. P.M. 38·7°C.

26th.—Temp. A.M. 38·3°C. Blood not examined. Temp. P.M. 38·4°C.

27th.—Temp. A.M. 38·1°C. Œdema of all fore-limbs. Hæmatozoa very numerous in the blood. Temp. P.M. 38·2°C.

28th.—Temp. A.M. 38·2°C. Hæmatozoa very numerous in the blood. Temp. P.M. 38·4°C.

29th.—Temp. A.M. 38·1°C. Hæmatozoa very numerous in the blood. Temp. P.M. 38·3°C.

30th.—Temp. A.M. 38°C. Hæmatozoa few in the blood. Temp. P.M. 38·2°C.

31st.—Temp. A.M. 38·1°C. Hæmatozoa absent from the blood. Temp. P.M. 38·1°C.

1st April.—Temp. A.M. 37·2°C. Hæmatozoa absent from the blood. Temp. P.M. 37·5°C.

2nd.—Temp. A.M. 37·6°C. Hæmatozoa few in the blood. Temp. P.M. 37·8°C.

3rd.—Temp. A.M. 37·5°C. Hæmatozoa numerous in the blood. Temp. P.M. 37·5°C.

4th.—Temp. A.M. 38·5°C. Hæmatozoa numerous in the blood. Temp. P.M. 38·4°C.

5th.—Patient has now very considerable œdema of the sheath; has all through suffered from conjunctivitis of both eyes and this condition is now aggravated. Temp. A.M. 39·8°C. Hæmatozoa numerous in the blood. Temp. P.M. 39·9°C.

6th.—Temp A.M. 39·6°C. Hæmatozoa very numerous in the blood. Temp. P.M. 39·8°C.

7th.—A.M. 38·6°C. Hæmatozoa numerous in the blood. Temp. P.M. 38·4°C.

8th.—Temp. A.M. 37·8°C. Hæmatozoa numerous in the blood. Temp. P.M. 40·1°C.

9th.—Temp. A.M. 39·7°C. Hæmatozoa very numerous in the blood. Temp. P.M. 39·8°C.

10th.—Temp. A.M. 39·5°C. Hæmatozoa very numerous in the blood. Temp. P.M. 39·6°C.

11th.—Temp. A.M. 39·1°C. Hæmatozoa very numerous in the blood. Temp. P.M. 39·4°C.

12th.—Temp. A.M. 39·1°C. Hæmatozoa very numerous in the blood. Temp. P.M. 39·6°C.

13th—Temp. A.M. 39·8°C. Hæmatozoa numerous in the blood. Temp. P.M. 39·8°C.

14th.—There is œdema of the sheath and some effusion into the tunicæ vaginales. Temp. A.M. 38·7°C. Hæmatozoa numerous in the blood. Temp. P.M. 38·9°C.

15th.—Temp. A.M. 38·6°C. Hæmatozoa numerous in the blood. Temp. P.M. 38·9°C.

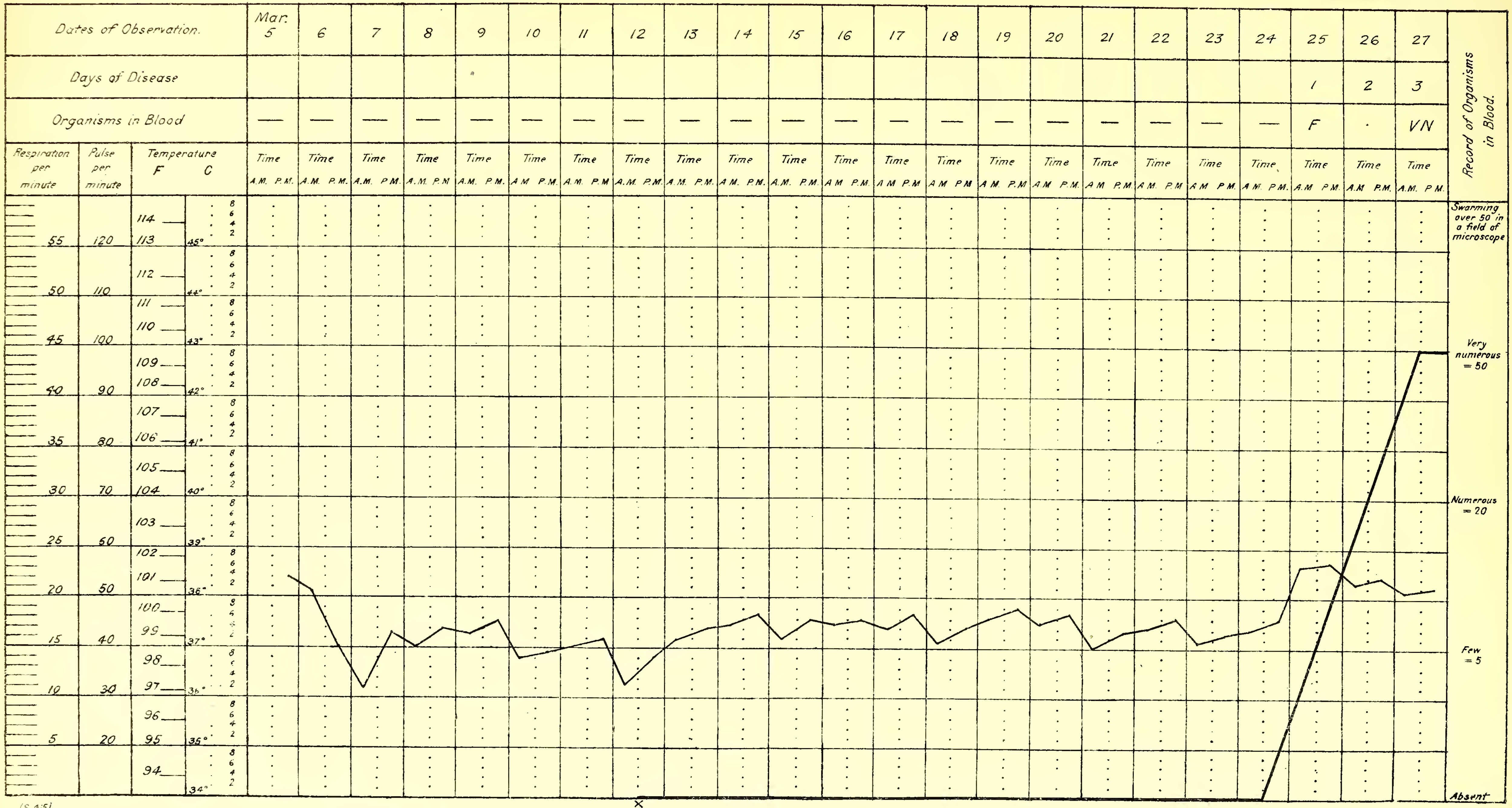
16th.—Temp A.M. 39·5°C. Hæmatozoa very numerous in the blood. Temp. P.M. 39·8°C.

17th.—Temp. A.M. 39·4°C. Hæmatozoa very numerous in the blood. Temp. P.M. 39·7°C.

18th.—Temp. A.M. 39·3C°. Hæmatozoa numerous in the blood. Temp. P.M. 39·5°C. The œdema is increasing and now extends along the under-surface of the abdomen as far back as the scrotum.

Country-bred Chestnut Gelding ——— Age, Aged ——— Sex, Gelding ——— Colour, Chestnut

Disease, Inoculated Horse Surra ——— Date of Inoculation, 12. 3. 1891. ——— Result, Death ——— Date of Result, 22. 4. 91. ——— Register No. XVIII



Dates of Observation.	Mar. 5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
Days of Disease																					1	2	3
Organisms in Blood	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	F	·	VN

(S 415)

Hæmatozoon curve
Temperature ....

Drawn & Litho. Govt. Photozinco: Office Poona 1892.

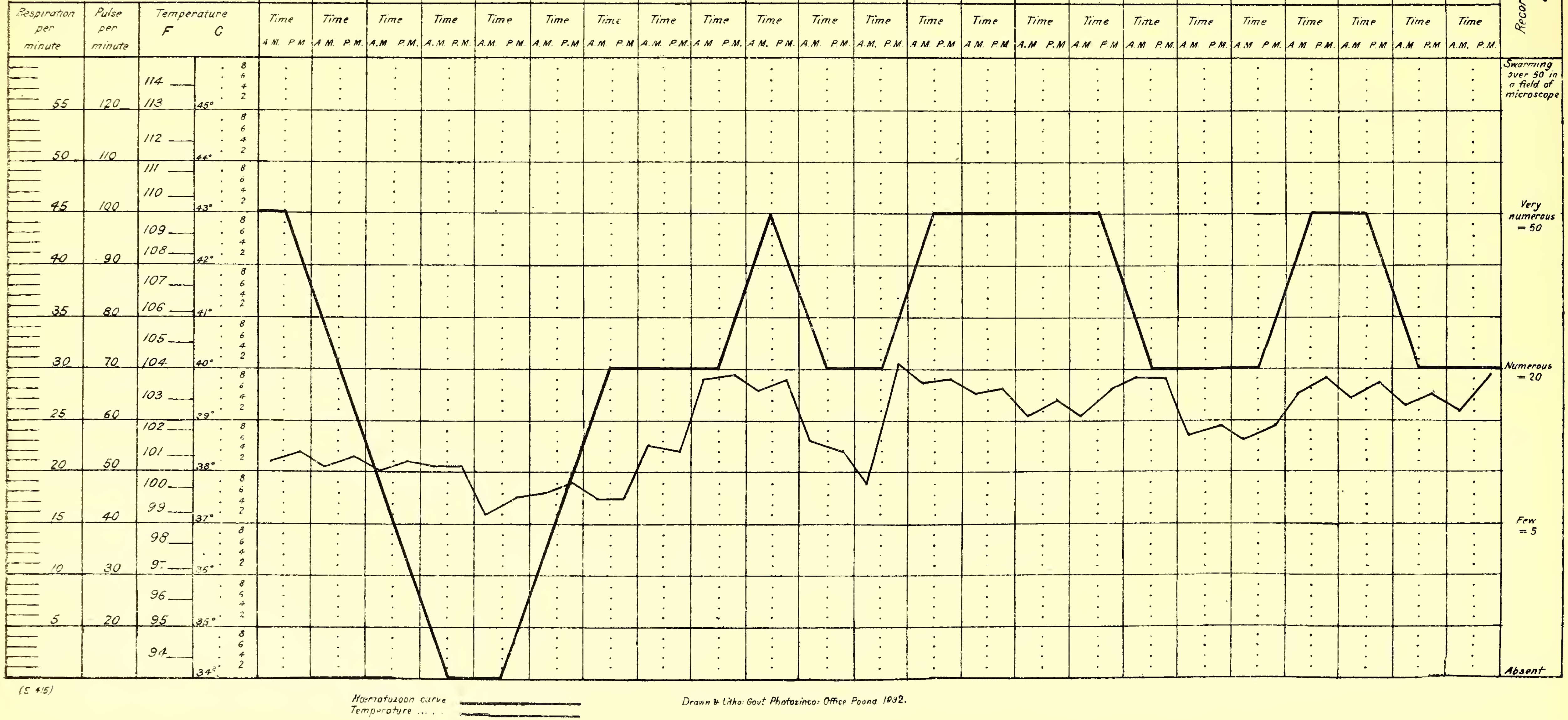
× Inoculated Subcutaneously with 1·0 cc of blood from the heart of Horse Nº XV. 10 hours P.M.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age Sex Colour

Disease Date of Attack Result Date of Result Register No. XVIII

Dates of Observation.	Mar. 28	29	30	31	April 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Days of Disease	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Organisms in Blood	VN	N	F	—	—	F	N	N	N	VN	N	N	VN	VN	VN	VN	N	N	N	VN	VN	N	N



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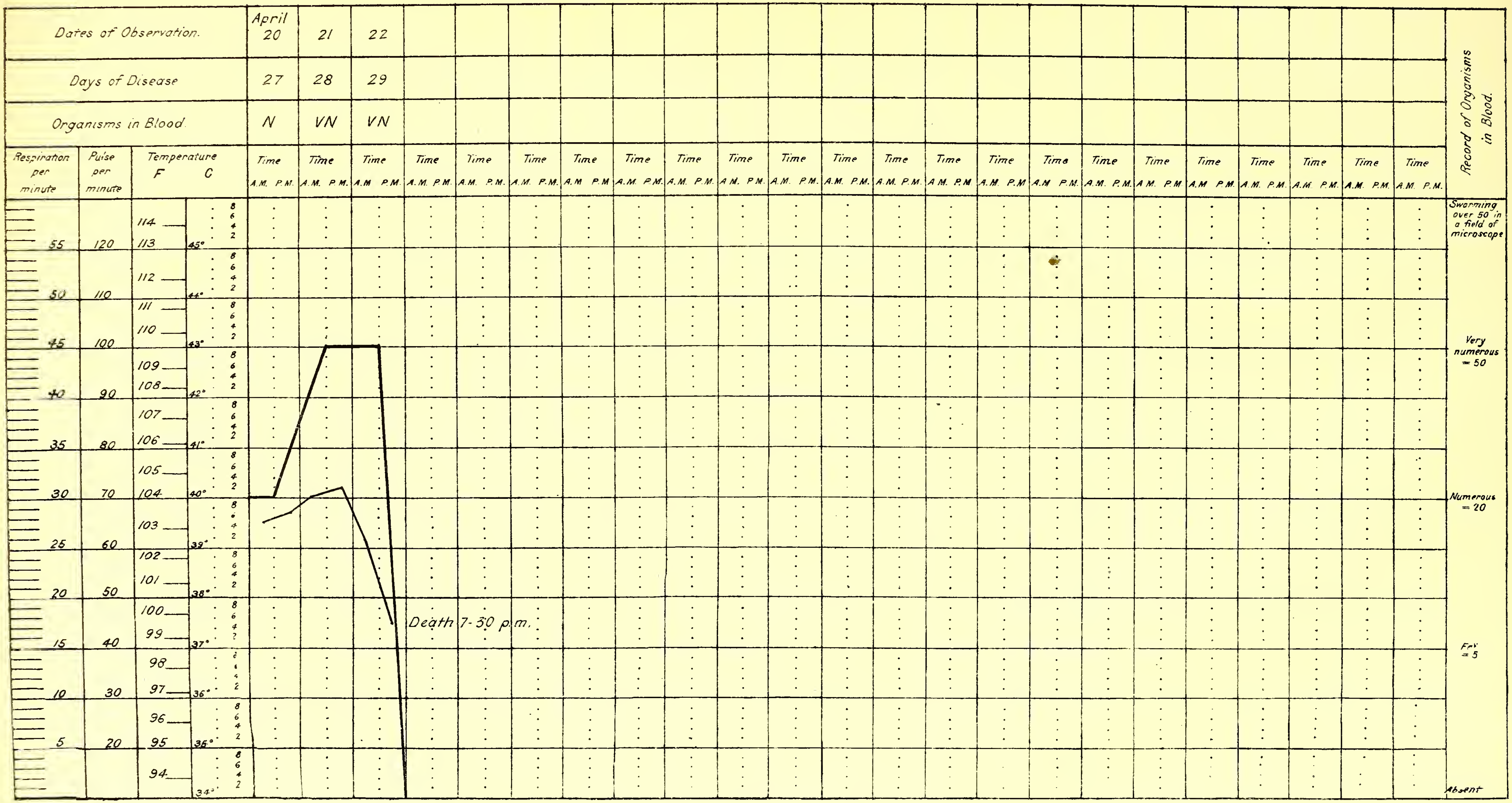
Drawn & Litho: Govt. Photozinco: Office Poona 1892.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Disease — Date of Attack — Result — Age — Date of Result — Sex — Register No. XVIII — Colour



(S 415)

Hæmatozoon curve ————

Temperature ……… ————

Drawn & Litho: Govt. Photozinco: Office Poona 1892.

19th.—Last night the animal lay down and this morning was unable to rise, consequently it was placed in slings. Temp. A.M. 39·2°C. Hæmatozoa numerous in the blood. Temp. P.M. 39·9°C.

20th.—The limbs are swollen and exceedingly œdematous. The appetite remains very good. Temp. A.M. 39·5°C. Hæmatozoa numerous in the blood. Temp. P.M. 39·7°C.

21st.—The œdema of the sheath and scrotum has increased considerably. Appetite very good. Temp. A.M. 40°C. Hæmatozoa very numerous in the blood. Temp. P.M. 40·2°C.

22nd.—Temp. A.M. 39·2°C. Hæmatozoa very numerous in the blood. Temp. P. M. 37·5°C. The animal is certainly weaker than yesterday and the appetite has fallen off. At 7 P.M. some difficulty of breathing supervened and the animal stands with its head hanging down. Death took place at 7·30 P.M.

AUTOPSY at 9·30 A.M. *23rd.*—Body very little emaciated. Fore and hind limbs considerably œdematous; œdema of scrotum and sheath extends along the under-surface of the abdomen, forwards on to the chest. There is no fluid in the pleural cavities.

Lungs.—The apices are the seat of emphysema. The superior surface presents an undulating appearance caused by numerous raised portions varying in size, some are small and circular and others irregular in outline, the result of several masses becoming confluent, hard to the touch and dark red in colour, their outline being somewhat sharply defined. *On section* the lung is firmer and looks more solid than the normal tissue, but the condition is not one of consolidation, and a small piece placed in water does not sink. *On section* of the organs from apex to base, the colour presented is a mottled yellowish-red, whilst certain narrow irregular shaped portions of the organ lying close to the surface, present a red hue.

The *pericardial sac* does not contain an excess of fluid.

Heart.—The fat adherent to the heart presents the yellow-gelatinous condition, observed at previous post-mortems on Surra patients. On the external surface especially posteriorly there are several groups of round or irregular shaped extravasations of blood lying under the visceral pericardium; *on section* numerous large yellow-coloured clots are found to occupy the right and left cavities of the organ extending up the great vessels in communication with them. The endocardial surfaces of the *right auricle* and *ventricle* are somewhat pale. There are no ecchymoses present. The *left auricle* and *ventricle* are also pale in colour, but the latter especially. There are several sub-endocardial extravasations mostly situated upon the musculi-papillares. The walls of the left ventricle appear somewhat hypertrophied, but all the valves are perfectly healthy.

Liver.—Small; there are some signs of old peri-hepatitis, especially on the convex surface of the right lobe. The surface of the organ as also on section presents a yellowish-red colour. There are scattered here and there on the upper and inferior surfaces of the organ, lying under the capsule, a few small, white, circular shaped bodies, slightly raised above the general level of the organ.

Spleen.—Weighs 2 lbs. 11½ ozs., and is somewhat soft but probably owing to *Post-mortem* changes. There are no petechiæ on the surface of the capsule, or changes to notice *on section* of the organ.

Kidneys.—The capsules strip easily and appear healthy to the naked eye.

Stomach.—Small in size, contains some semi-digested food, but no pathological lesions are observable.

Small intestines.—Healthy. Cæcum and colon distended with fæces, but there are no ecchymoses on the inner-surface of the gut.

The points of interest in this case are:—

(i). The soiled blood used to inoculate this horse, remained in the heart of the dead animal for ten hours previous to its being used, and on microscopical examination, no hæmatozoa were observed in it.

(ii). The long period of incubation after inoculation, viz., 13 days.

CASE No. XIX.—GREY C. B. HORSE, *aged, fairly strong and healthy.*

11*th March*, 1891.—Temp. P.M. 36·3°C.

12*th*.—Temp. A.M. 36·2°C. At noon the animal was inoculated subcutaneously with 2 c.c. of blood removed from the heart of Horse No. XV ten hours after death. Temp. P.M. 36·5°C.

13*th*.—Temp. A.M. 37·3°C. There is no change in the condition of the animal. Appetite good, evacuations normal. Temp. P.M. 37·5°C.

14*th*.—There is no change. Temp. A.M. 37·4°C. There are no hæmatozoa in the blood. Temp. P.M. 37·5°C.

15*th*.—There is slight œdema at the point of inoculation, the size of a shilling. Temp. A.M. 36·8°C. No hæmatozoa in the blood. Temp. P.M. 36·8°C.

16*th*.—The swelling and œdema have slightly increased. Temp. A.M. 36·5°C. No hæmatozoa in the blood. Temp. P.M. 36·7°C.

17*th*.—The animal's condition is unchanged, appetite good, visible mucous membranes clear, no petechiæ, pulse normal, evacuations natural. Temp. A.M. 38°C. No hæmatozoa in the blood. Temp. P.M. 38·4°C.

18*th*.—The swelling and œdema has increased and now the tumor measures 1·5″ in diameter, it is somewhat tense and tender upon manipulation. Temp. A.M. 37·3°C. The pulse is slightly accelerated, but the respirations are normal. No hæmatozoa in the blood. Temp. P.M. 37·7°C.

19*th*.—The condition of the animal is unchanged, with this exception that the swelling and œdema have slightly increased in extent, but then no petechiæ on the conjunctival membranes. Temp. A.M. 38·5°C. No hæmatozoa in the blood. Temp. P.M. 38·7°C.

20*th*.—The animal appears somewhat dull this morning; there is increase of the swelling and œdema at the seat of inoculation which has now attained the size of the palm of the hand, and is tense and tender on manipulation. The temperature this morning has risen to 40·1°C., and pulse is full and frequent There are no hæmatozoa in the blood. Temp. at 1 P.M. 41·1°C., but by 5 P.M. the temp. had fallen to 39·9°C.

21*st*.—The animal is brighter this morning, appetite good, the swelling at the seat of inoculation is certainly less tense to the touch, and immediately conveys the idea to one that the hæmatozoa have become generalized throughout the circulation. Temp. A.M. 39·1°C. The hæmatozoa are few in the blood for the first time and later in the day several small petechiæ were noticeable on the left membrana nictitans, and two small ones on the right. Temp. P.M. 39·3°C.

22*nd*.—The condition of the animal has improved since yesterday. The appetite is very good and the evacuations quite natural. Temp. A.M. 37·5°C. P. 38. R. 16. There are a few hæmatozoa in the blood. Temp. P.M. 37·6°C.

23*rd*.—The animal is again somewhat dull, the membranes present more petechiæ, and the appetite is not so good. Temp. A.M. 39°C. The hæmatozoa are now numerous in the blood. Temp. P.M. 39·3°C.

24*th*.—There is no change in the condition of the animal. Temp. A.M. 37·9°C. The pulse is somewhat accelerated. Temp. P.M. 37·5°C.

25*th*.—The animal has improved somewhat in condition, the swelling and œdema have been considerably reduced in size and the tenderness on manipulation has almost disappeared. Temp. A.M. 37·2°C. The hæmatozoa are numerous in the blood. Temp. P.M. 37·4°C.

26*th*.—This morning the animal appears bright, and the appetite is good. Temp. A.M. 37·6°C. The blood was not examined this morning. Temp. P.M. 37·8°C.

27*th*.—The condition of the animal has changed during the night, and although the appetite is good and the evacuations normal, the animal did not lie down during the night and all fore-limbs are œdematous. Temp. A.M. 37·9°C. Pulse somewhat frequent, but easily compressible. The hæmatozoa are very numerous in the blood. Temp. P.M. 38·1°C.

28*th*—Condition unchanged, appetite good. Temp. A.M. 38·5°C. The hæmatozoa are numerous in the blood. Temp. P.M. 38·6°C.

29*th*.—Condition unchanged. Temp. A.M. 38·3°C. Hæmatozoa numerous in the blood. Temp. P.M. 38·5°C.

30*th*.—The swelling and œdema are reduced still more in size, but the limbs are, if any thing, rather more œdematous. Temp. A.M. 37·7°C. Hæmatozoa are absent from the blood. Temp. P.M. 37·6°C.

31*st*.—The state of the animal is unchanged. Temp. A.M. 37·8°C. Hæmatozoa are numerous in the blood. Temp. P.M. 37·9°C.

1*st April*.—The animal is dull this morning and the appetite is poor, evacuations normal. Temp. A.M. 40°C. The hæmatozoa numerous in the blood. Temp. P.M. 39·8°C.

2*nd*.—The animal continues in the same condition and appears somewhat weak in the limbs; the swelling and œdema of the legs continues. Temp. 39·4°C. The hæmatozoa are very numerous in the blood. Temp. P.M. 39·7°C.

3rd.—The condition of the animal is unchanged, but the appetite is good, and the fæces healthy looking. Temp. A.M. 39.6°C. Pulse fairly good. Respirations normal. The hæmatozoa are very numerous in the blood. Temp. P.M. 39·2°C.

4th.—The condition continues the same. Temp. A M. 39·3°C. The hæmatozoa are still numerous in the blood. Temp. P.M. 39·5°C.

5th.—The animal moves, as if he were suffering from some lesion of the spinal cord and it has been put in slings. Temp. A.M. 38·4°C. Hæmatozoa numerous in the blood. Temp. P.M. 38·7°C.

6th.—Condition unchanged. Temp. A.M. 38·4°C. Hæmatozoa numerous in the blood. Temp. P.M. 38·5°C.

7th.—Condition unchanged. Temp. A.M. 38·3°C. The hæmatozoa are numerous in the blood. Temp. P.M. 39·6°C.

8th.—Condition of animal changed for the worse, it is dull, the appetite poor, and there are numerous fresh petechiæ on the mucous membranes of both eyes. Temp. A.M. 40·1°C. Pulse accelerated and full. Hæmatozoa very numerous in the blood. Temp. P.M. 41·2°C.

9th.—Condition unchanged. Temp. A.M. 40·5°C. The hæmatozoa are numerous in the blood. Temp. P.M. 40·7°C.

10th.—Condition unchanged. Temp. A.M. 40·5°C. The hæmatozoa are still numerous in the blood. Temp. P.M. 40·5°C.

11th.—The animal appears to be brighter, the appetite is good and the petechiæ on the mucous membranes of the eye are fading. Temp. A.M. 38·5°C. The hæmatozoa are absent from the blood. Temp. P.M. 39·8°C.

12th.—The animal continues bright, and the appetite good, there is very slight, if any, change in the amount of œdema and swelling of the limbs. Temp. A.M. 39·4°C. The hæmatozoa are again absent. Temp. P.M. 39·6°C.

13th.—There is no perceptible difference in the condition of the animal. Temp. A.M 39·4°C. Hæmatozoa few. Temp. P.M. 39·6°C.

14th.—Condition unchanged. Temp. A.M. 39·8°C. Hæmatozoa very numerous. Temp. P.M. 39·8°C.

15th.—Condition unchanged. Temp. A.M. 39·5°C. Hæmatozoa very numerous. Temp. P.M. 39·8°C.

16th.—Condition unchanged. Temp. A.M. 39·3°C. Hæmatozoa numerous. Temp. P.M. 39·4.°C.

17th.—Condition unchanged. Temp. A.M. 39·1°C. Hæmatozoa few in the blood. Temp. P.M. 39 5°C.

18th.—Condition unchanged. Temp. A.M. 38·3°C. Hæmatozoa few in the blood. Temp. P.M. 38·6°C.

19th.—Condition unchanged. Temp. A.M. 38·4°C. Hæmatozoa few in the blood. Temp. P.M. 39·2°C.

20th.—Condition unchanged. Temp. A.M. 39·1°C. Hæmatozoa numerous in the blood. Temp. P.M. 39·4°C.

21st.—Condition unchanged. Temp. A.M. 40·3°C. Hæmatozoa very numerous in the blood. Temp. P.M. 40·5°C.

22nd.—Condition unchanged. Temp. A.M. 39·4°C. Hæmatozoa very numerous in the blood. Temp. P.M. 39·6°C.

23rd.—Condition unchanged. Temp. A.M. 39·3°C. Hæmatozoa numerous in the blood. Temp. P.M. 39·6°C.

24th.—Condition unchanged. Temp. A.M. 38·1°C· Hæmatozoa numerous in the blood. Temp. P.M. 38·5°C.

25th.—Condition unchanged. Temp. A.M. 39·5°C. Hæmatozoa very numerous in the blood. Temp. P.M. 40·3°C.

26th.—Condition unchanged. Temp. A.M. 40·1°C. Hæmatozoa very numerous in the blood. Temp. P.M. 40·4°C.

27th.—Condition unchanged. Temp. A.M. 39·1°C. Hæmatozoa numerous in the blood. Temp. P.M. 39·1°C.

28th.—Condition unchanged. Temp. A.M. 39·8°C. Hæmatozoa few in the blood. Temp. P.M. 39·9°C.

29*th.*—The condition of the animal is absolutely unchanged. Temp. A.M. 38·6°C. The hæmatozoa are absent from the blood. Two Horses Nos. XIII and XXI were each inoculated subcutaneously with 1 c.c. of blood drawn from the Jugular Vein of this animal. Temp. P.M. 39·6°C.

30*th.*—Condition remains unaltered. The appetite is good and the evacuations healthy, though the swelling and œdema of the limbs remain the same. Temp. A.M. 39·8°C. The hæmatozoa are few in number in the blood. Temp. P.M. 39·5°C.

1*st May.*—The condition of the animal remains the same. Temp. A.M. 38·8°C. The hæmatozoa few in the blood. Temp. P.M. 39·4°C.

2*nd.*—The animal is getting feeble and there is considerable œdema of the limbs, as also of the abdomen and sheath. Temp. 38·7°C. The hæmatozoa are numerous in the blood. Temp. P.M. 39.4°C.

3*rd.*—Condition unchanged. Temp. A.M. 40·1°C. Hæmatozoa numerous in the blood. Temp. P.M. 40·2°C.

4*th.*—The appetite is not so good to-day and the swelling and œdema of the abdomen and sheath has still more increased in amount. Temp. A.M. 39·8°C. Hæmatozoa swarming in the blood. Temp. P.M. 40·1°C.

5*th.*—Condition unchanged. Temp. A.M. 39·5°C. Hæmatozoa numerous in the blood. Temp. P.M. 39·1°C.

6*th.*—Condition unchanged, the appetite still continues to be good. Temp. A.M. 37·5°C. Hæmatozoa absent from the blood. Temp. P.M. 38·6°C.

7*th.*—The animal is about the same, appetite good. Evacuations normal. Temp. A.M. 38·2°C. Hæmatozoa absent from the blood. Temp. P.M. 38·5°C.

8*th.*—The œdema has increased still more and is now running up the groins, on either side, and the scrotum is protruding from behind the legs. Temp. A.M. 37·9°C. The hæmatozoa are absent from the blood. Temp. P.M. 40·4°C·

9*th.*—The œdema has increased still more, and is now bulging forward in front of the flanks. The appetite however still remains very good. Temp. P.M. 40°C. Hæmatozoa numerous is the blood. Temp. P.M. 40·6°C.

10*th.*—The condition of the animal is unchanged, the appetite still remains very good. Temp. A.M. 40·2°C. Hæmatozoa very numerous in the blood. Temp. P.M. 40·5°C.

11*th.*—The animal is very dull, the appetite is poor. Temp. A.M. 40·4°C. Hæmatozoa very numerous in the blood. Temp. P.M. 40·6°C.

12*th.*—The œdema of the sheath, and abdomen has subsided to a small extent, the appetite is again good. Temp. A.M. 40·2°C. Hæmatozoa are very numerous in the blood. Temp. P.M. 39·6°C.

13*th.*—The œdema is certainly less in amount, the animal is, if anything, slightly stronger this morning. It is standing up without support, the first time for many days. Temp. A.M. 39·8°C. Hæmatozoa very numerous in the blood. Temp. P.M. 39·6°C.

14*th.*—The condition of the animal is unchanged, the appetite remains good and the evacuations are natural. Temp. A.M. 39·4°C. Hæmatozoa are numerous in the blood. Temp. P.M. 39·6°C.

15*th.*—The animal is weaker and has taken little or no food since last evening at six o'clock. Death took place at 2 A.M.

AUTOPSY.—At 9-30 A.M. seven and a half hours after death. The body is somewhat emaciated. Rigor mortis is well marked. On removal of the skin, there is a large amount of a yellowish coloured exudation lying in the subcutaneous tissue of the front of the chest, abdomen, around the sheath and scrotum.

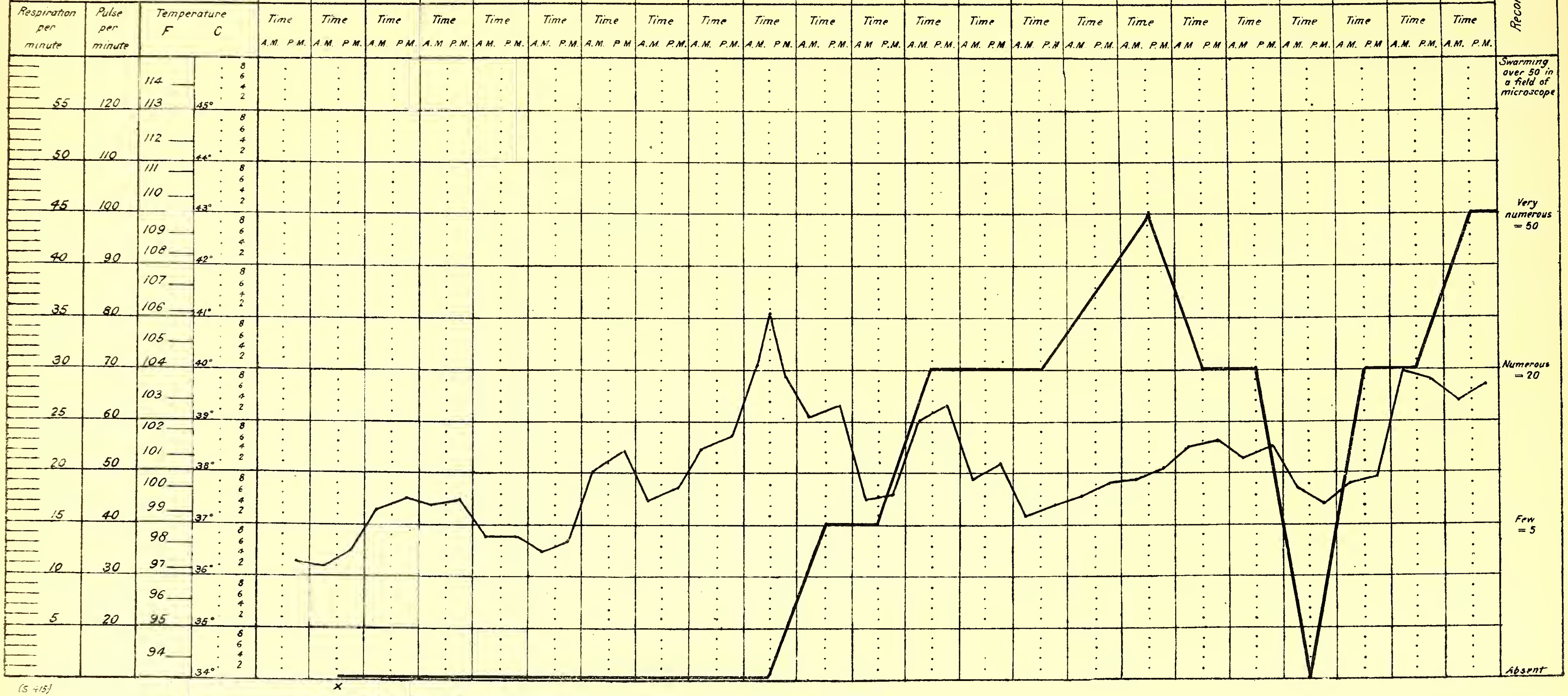
Thorax.—There is no fluid in the pleural cavities, or adhesions between the visceral and parietal pleuræ.

The *right lung* presents a peculiar appearance, some portions are raised, others depressed. On passing the hand over the surface of the organ, hard irregular-shaped, elevated masses are felt, in some instances involving the whole thickness of the organ. These irregular shaped masses have well defined sharp edges separating them from the adjacent healthy tissue. Their structure is firm and tough, and *on section* presents a very fine reticulated structure resembling a stale sponge cake. Some portions present a mixed yellowish-red colour, others mottled red and yellow areas ⅛th of an inch in length, which remind one of the changes observed in the lungs of a child which succumbed to an attack of Acute Lymphadenoma.

The *left lung.*—The apex, superior and inner border as well as the inferior free edge of the organ are the seat of emphysematous changes, and the base of the organ is the seat of the same changes as those described in the right lung.

Disease, Inoculated Horse "Surra" —— Date of Inoculation, 12 . 3. 91. —— Result Death. —— Date of Result, 15. 5. 91 —— Register No. — XIX. ——

Dates of Observation	March 11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	April 1	2
Days of Disease											1	2	3	4	5	6	7	8	9	10	11	12	13
Organisms in Blood.	—	—	—	—	—	—	—	—	—	—	F	F	N	N	N	-	VN	N	N	—	N	N	VN



(S 415)

Hæmatozoon curve ——
Temperature …… ——

Drawn & Litho. Govt Photozinco: Office Poona 1892.

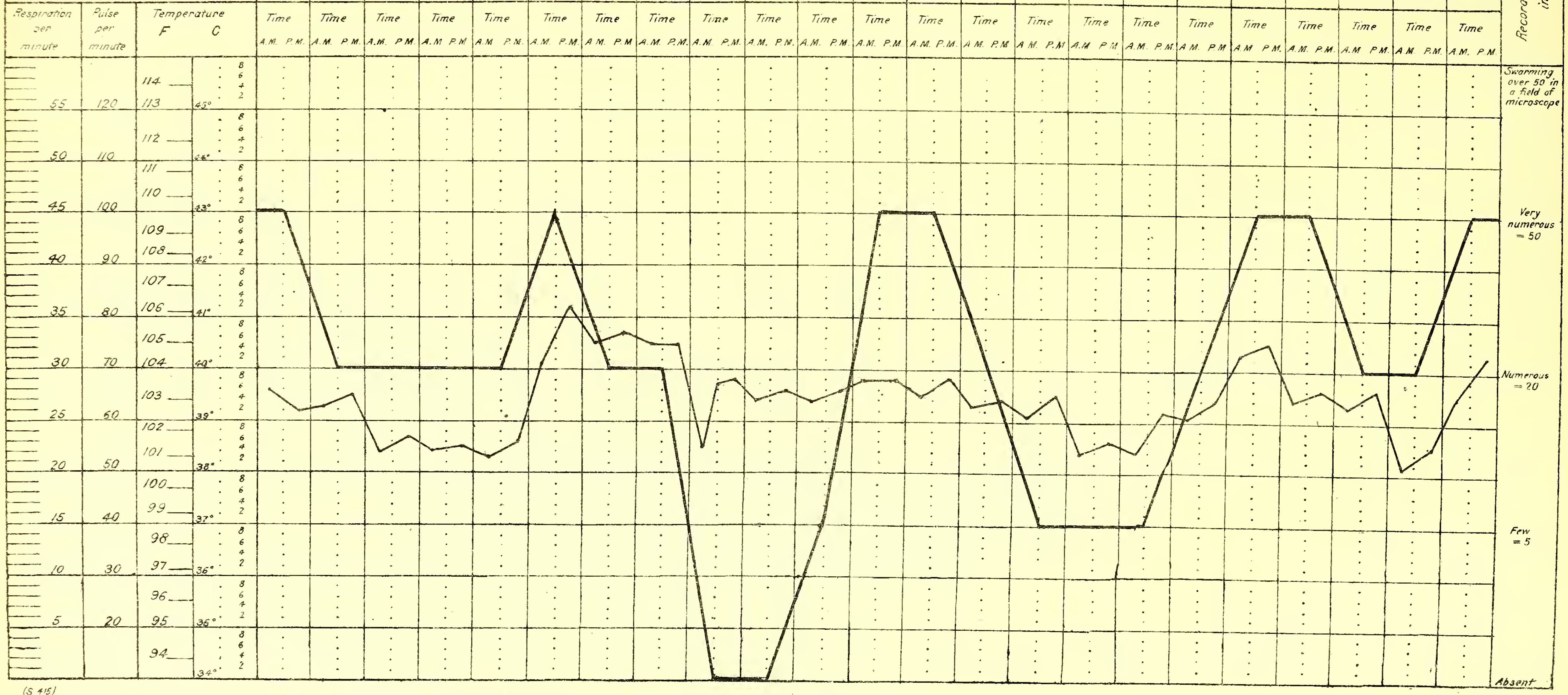
× Inoculated with 2·0 cc of blood taken from the heart of Horse No. XV.; 10 hours P.M.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age ______ Sex ______ Colour ______

Disease ______ Date of Attack ______ Result ______ Date of Result ______ Register No. — XIX.

Dates of Observation.	April 3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Days of Disease	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Organisms in Blood.	VN	N	N	N	N	VN	N	N	—	—	F	VN	VN	N	F	F	F	N	VN	VN	N	N	VN



(S 415)

Hæmatozoon curve
Temperature . . . .

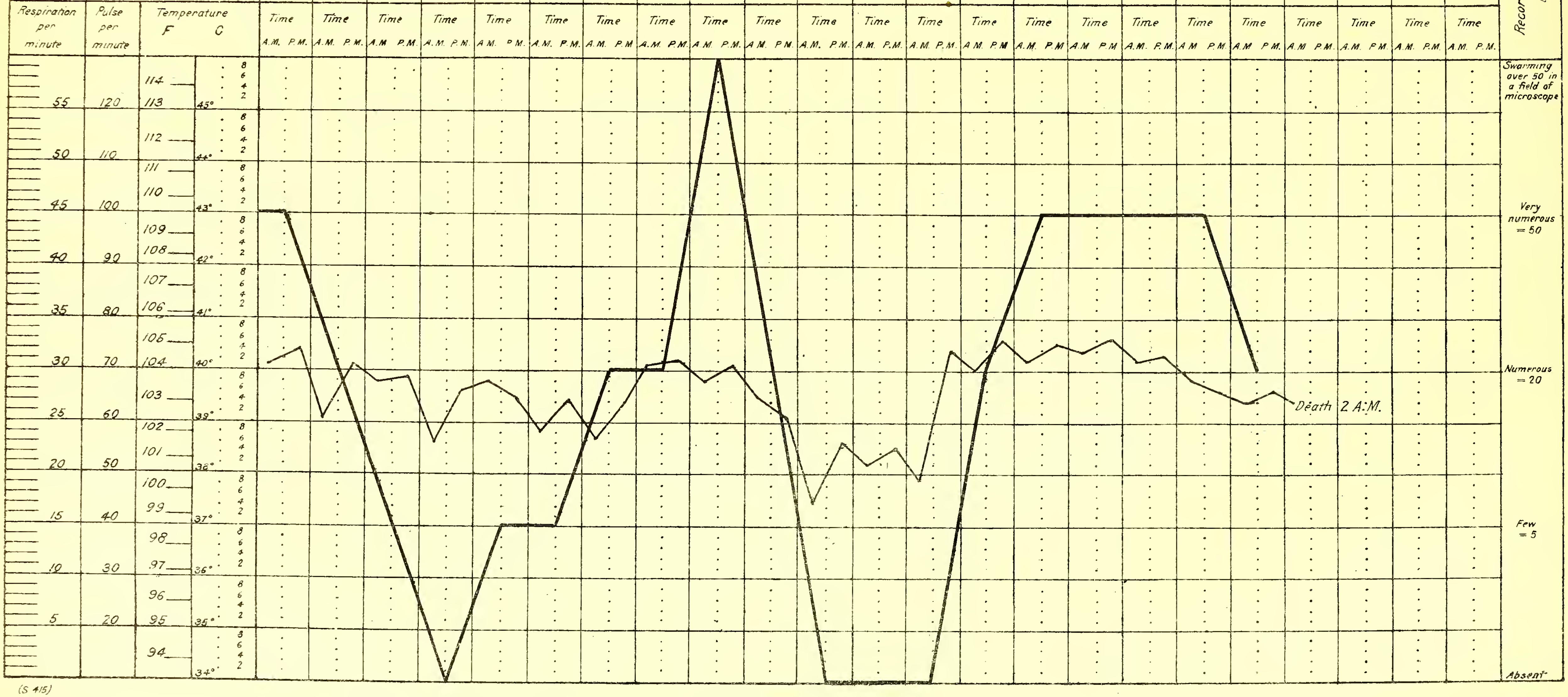
Drawn & Litho: Govt Photozinco: Office Poona 1892.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age ____ Sex ____ Colour ____

Disease ____ Date of Attack ____ Result ____ Date of Result ____ Register No. XIX.

Dates of Observation.	April 26	27	28	29	30	May 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15			
Days of Disease	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56			
Organisms in Blood	VN	N	F	—	F	F	N	N	S	N	—	—	—	N	VN	VN	VN	VN	N				



(S 415)

Hæmatozoon curve ————

Temperature .... ————

Drawn & Litho. Govt. Photozinco: Office Poona 1892.

Heart.—The pericardial sac contains about two ounces of a yellowish-red coloured fluid. No hæmatozoa observed on microscopical examination.

The organ is large, somewhat dilated and hypertrophied. There are a few small extravasations dotted over the surface of the heart, which are beneath the visceral pericardium. The *right auricle* contains a few clots but there are no ecchymoses. The *right ventricle* contains decolourized clot and some dark fluid blood—walls ⅜th inch in thickness. No ecchymoses, valves normal. The *left auricle* is normal. The *left ventricle* is contracted. *On section,* the walls are two inches in thickness at their widest part. The auriculo-ventricular valves present two extravasations of blood, which are lying beneath the endocardial covering. The muscular tissue of the organ is pale and on careful observation some slight extravasations are visible, dotted over the surface of the musculi-papillares. These are also found to be lying under the endocardium and do not appear to dip into the muscular structure of the organ.

Abdominal cavity.—There is no fluid in the peritoneal cavity.

The Liver is dark in colour, there are some signs of old perihepatitis, especially on the convex surface of the left lobe. The surface of the organ is dotted over with a large number of circular, opalescent patches, varying in size from a pin's head to a diameter of ⅛th of an inch. On passing the hand over the surface of the organ, these bodies are found to be somewhat raised above the general surface of the tissues, hard, and are easy to enucleate. *On section* the liver is very dark in colour, with numerous of the above hard bodies lying dotted in its substance.

The Stomach is small, and contains a little semi-digested food. The whole of the *cuticular* portion presents a bright yellow colour, whilst the line of demarcation between the cuticular and the villous portion is of a bright orange colour. This colour extends for at least 1·5 inches to 2 inches on to the cuticular side of the boundary line. The *villous* portion of the stomach is pale, with the exception of one small area about ½ an inch square, which presents a slightly congested condition of the vessels on the surface of the mucous-membrane. There are three crypt-like excavations small in size lying on the top of the rugæ close to the limiting line.

Spleen.—Weighs 1 lb. 9 ozs.—There are some small ecchymoses on the surface of the capsule, dark brick-red in colour. *On section* the tissue of the organ is firm and healthy-looking.

Kidneys.—The capsule strips easily from both organs, but the stellate veins are somewhat injected. *On section,* the organs are pale, but they do not appear to present any pathological lesion to the naked eye.

The points of interest in this case are :—

(i). The successful transmission of the disease after the injection of 2·c.c. of blood taken from the heart, ten hours after death and from which the hæmatozoa at the time of inoculation were absent, although on the day previous to it, they had been found to be numerous on microscopical examination.

(ii). The period of incubation, or the time elapsing between the inoculation and the first appearance of the hæmatozoa in the blood was nine days.

(iii). The time which elapsed between the first appearance of the hæmatozoon in the blood and death was fifty-five days, so that from inoculation to the time of death occupied sixty-four days.

(iv). The extensive pathological lesions as evidenced by the presence at the *Post-mortem* examination of a large quantity of yellow-coloured jelly-like exudation in the subcutaneous tissue of the front of the chest, abdomen and sheath.

(v). The presence of peculiar areas of tissue in the lungs, presenting a very fine reticulate structure.

(vi). The changes presented by the heart, both externally and internally.

(vii). The deposition of a yellow-coloured material on the surface of the cuticular portion of the stomach.

CASE No. XXVII.—BROWN, C. B. HORSE, *aged, in fair condition and apparently healthy.*

June 26th, 1891.—Temperature p.m. 36·8° C.

„	*27th*...	Temperature	A.M.	36°C.	P.M.	36·6°C.	Blood healthy.
„	*28th*...	„	„	36·2°C.	„	36·7°C.	„ „
„	*29th*...	„	„	36·1°C.	„	36·7°C.	„ „
„	*30th*...	„	„	37°C.	„	36·7°C.	„ „
July	1*st*...	„	„	36·5°C.	„	36·8°C.	„ „
„	2*nd* ..	„	„	37°C.	„	36·7°C.	„ „
„	3*rd*...	„	„	36·6°C.	„	38·7°C.	„ „
„	4*th*...	„	„	36·1°C.	„	36·8°C.	„ „
„	5*th*...	„	„	36·3°C.	„	36·5°C.	„ „
„	6*th*...	„	„	35·7°C.	„	36·7°C.	„ „
„	7*th*...	„	„	36·2°C.	„	36·7°C.	„ „
„	8*th*...	„	„	36·7°C.	„	37°C.	„ „
„	9*th*...	„	„	36·3°C.	„	37°C.	„ „
„	10*th*...	„	„	36·3°C.	„	37·3°C.	„ „
„	11*th*...	„	„	35·6°C.	„	36·8°C.	„ „
„	12*th*...	„	„	36·2°C.	„	36·8°C.	„ „
„	13*th*...	„	„	36·1°C.	„	37°C.	„ „
„	14*th*...	„	„	36·2°C.	„	37·5°C.	„ „
„	15*th*...	„	„	35·6°C.	„	37·4°C.	„ „
„	16*th*...	„	„	35·6°C.	„	37·5°C.	„ „

Inoculated subcutaneously over both Scapular Regions with 1 c.c. of blood taken from the ventricles of the heart of Horse No. XXX, sixteen hours after death. One cubic centimetre was injected on the right side from the right ventricle; and one cubic centimetre was injected on the left side from the left ventricle. No hæmatozoa were observed on careful microscopical examination of the injected blood.

17*th*.—The animal appears healthy, the appetite is good and the evacuations natural. The seat of inoculation on the left side presents considerable swelling and œdema over an area of 15″ × 12″, accompanied with tenderness on pressure. The seat of inoculation on the right side presents a slight œdematous swelling 1·5″ × 1″. There is no tenderness on pressure. The conjunctival membranes are clear, and there are no hæmatozoa in the blood. Temp. a.m. 35·7°C. Temp. p.m. 39·6°C.

18*th*.—There are well marked conjunctival ecchymoses especially on the membranes of the left eye. Temp. a.m. 37·3°C. There are no hæmatozoa in the blood. Temp. p.m. 37·6°C.

19*th*.—The swelling and œdema over the right shoulder has increased, and now extend down the left leg nearly to the foot: the left fore-leg is twice the size of the right, and there is some swelling and œdema in front of the chest and between the fore-legs. Temp. a.m. 37·4°C. There are no hæmatozoa in the blood. Temp. p.m. 37·6°C.

20*th*.—The swelling and œdema at the seat of inoculation on the left side has increased, but that on the right side is being rapidly absorbed. Temp. a.m. 37·2°C. The hæmatozoa are absent from the blood. Temp. p.m. 38°C.

21*st*.—This morning the swelling on the left side has again increased in amount. Temp. a.m. 37·7°C. 5 p.m. Some blood-stained pus has commenced to escape from the upper portion of the swelling on the left side; several ounces have come away. Temp. p.m. 38·4°C.

22*nd*.—The animal's appetite is good, and it is keeping up its strength fairly well. The œdema on the right side is disappearing rapidly, and since the escape of the fluid the swelling on the left side is much smaller. Temp. a.m. 37·6°C. There are no hæmatozoa in the blood. Temp. p.m. 37·6°C.

23*rd*.—This morning the œdema on the right side has almost entirely disappeared, only leaving a tumor at the seat of inoculation 3″ × 2″, which is tense and tender on manipulation. The œdema on the left side and fore-limb has disappeared and the swelling is smaller in size; the discharge continues. Temp. a.m. 36·7°C. There are no hæmatozoa in the blood. Temp. p.m. 36·7°C.

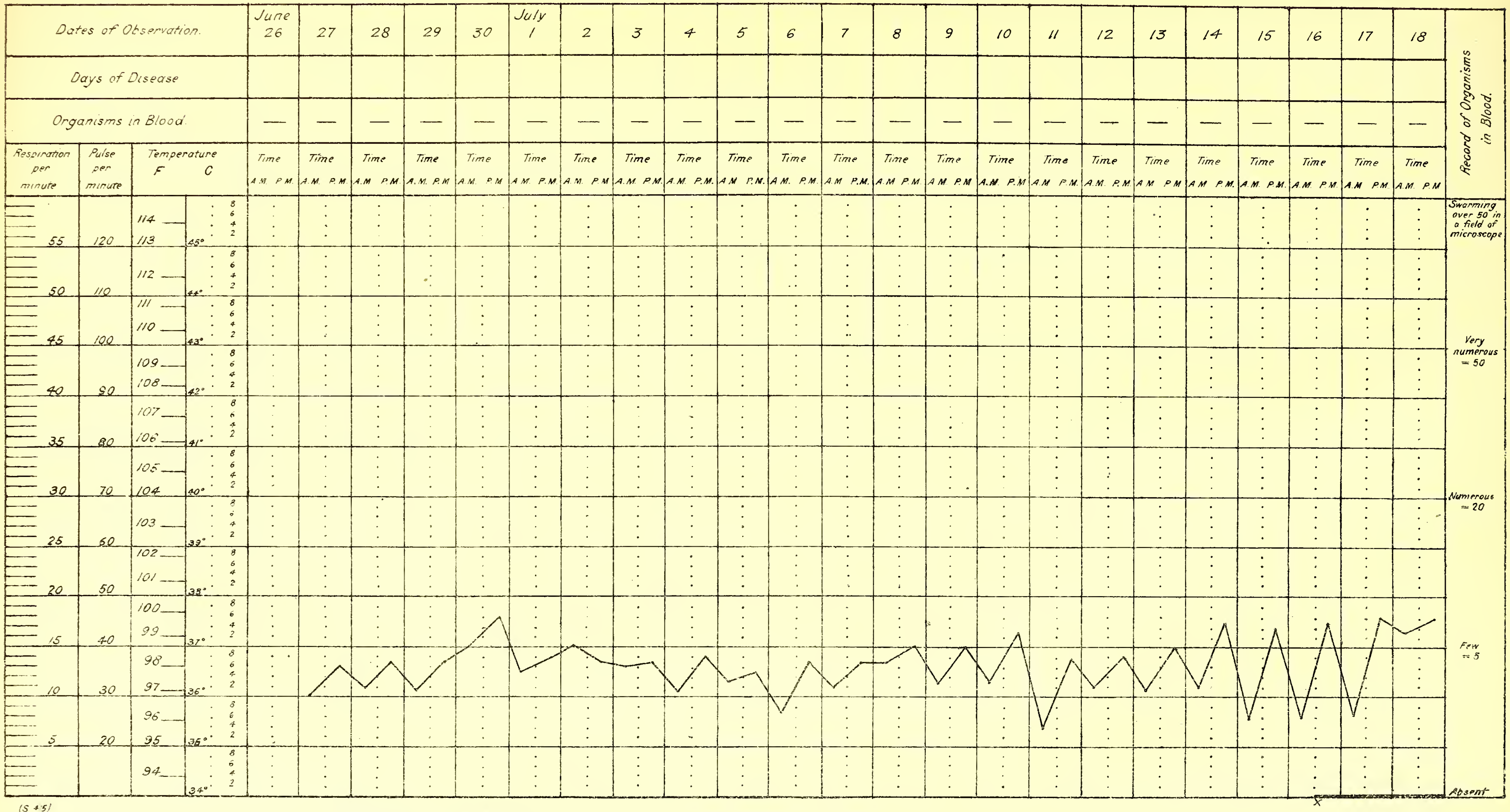
24*th*.—The animal appears healthy, the appetite is good and the evacuations normal in character. The swelling on the right side remains the same, that on the left is smaller and the discharge much less in amount. Temp. a.m. 37°C. The hæmatozoon is absent from the blood. Temp. p.m. 38·3°C.

25*th*.—Condition unchanged. Temp. a.m. 37·3°C. The hæmatozoa is absent from the blood. Temp. p.m. 37·°C.

26*th*.—The condition of the animal is unchanged. Temp. a.m. 37·1°C.

Brown Country-bred Gelding

Disease, Inoculated Horse 'Surra' Date of Inoculation, 16. 7. 1891. Result, Death Date of Result, 29. 7. 91 Register No. XXVII



(S 45)

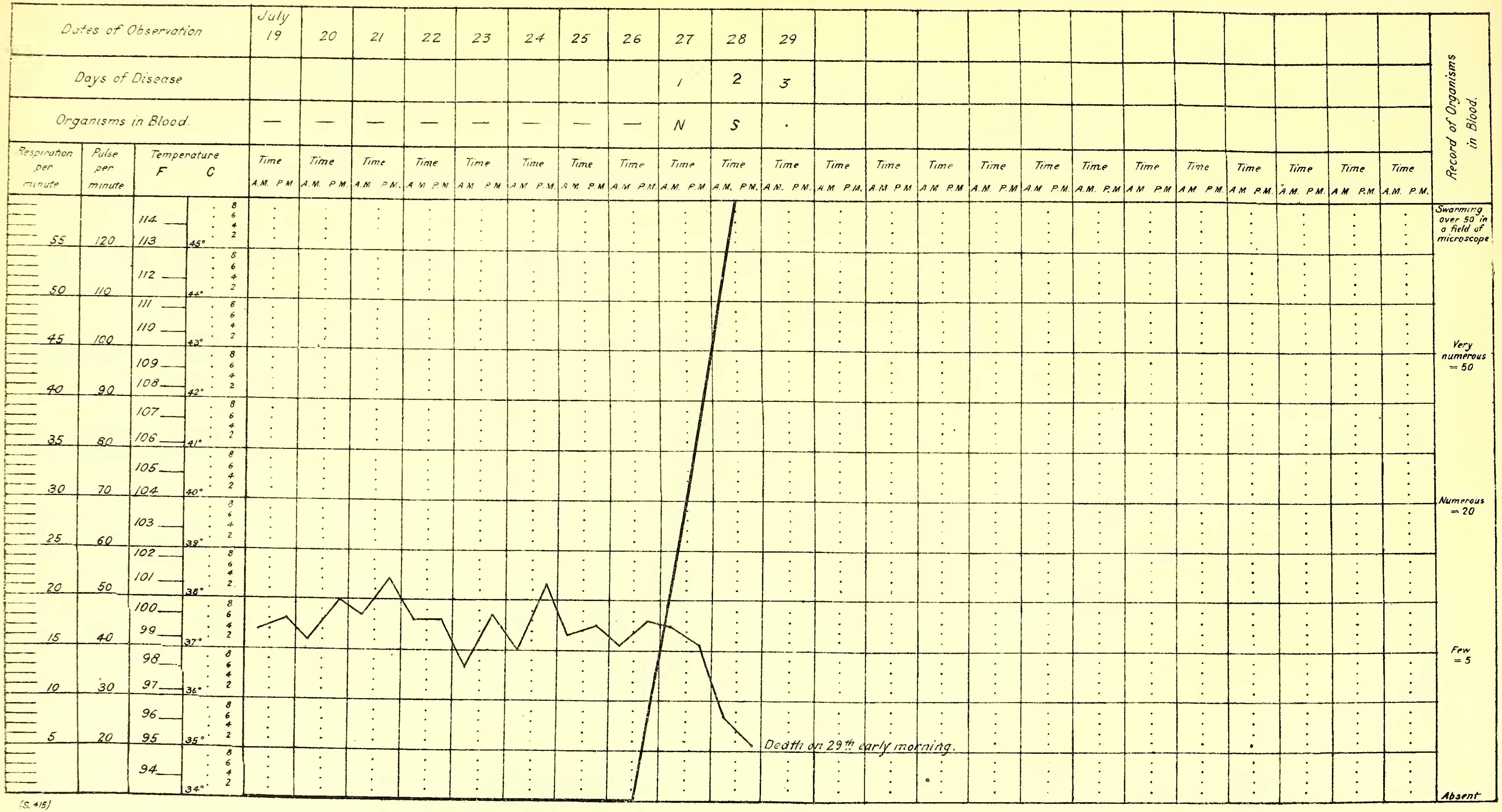
Hæmatozoon curve
Temperature ......

Drawn & Litho: Govt Photozinco: Office Poona 1892.

X Inoculated Subcutaneously with 1·0 cc of blood taken from the ventricles of the heart of Horse Nº XXX. 16 hours P.M.

Age ——— Sex ——— Colour ———

Disease ——— Date of Attack ——— Result ——— Date of Result ——— Register No. XXVII



(S. 415)

Hæmatozoon curve ———

Temperature ......

Drawn & Litho: Govt Photozinco: Office Poona 1892.

27th.—This morning the swelling on the right side is smaller in size and the tension is considerably reduced. Temp. A.M. 37·5°C. The hæmatozoa are numerous in the blood. Temp. P.M. 37·1°C.

28th.—Condition unchanged. Temp. A.M. 35·7°C. P.M. 35·1°C. Hæmatozoa swarming in the blood.

29th.—The animal became weaker during the night and death took place somewhat suddenly in the early morning.

AUTOPSY at 9 A.M. The body is somewhat emaciated, but there is no swelling or œdema of the extremities or under-surface of the abdomen.

Thorax.—There is no fluid in the pleural cavities, or adhesions of the parietal and visceral pleuræ.

The *lungs* are dotted over with circumscribed, small extravasations of blood, which are found to be lying under the visceral pleuræ. *On section,* the tissues present a healthy appearance.

Heart (weighs 5 lbs. 10 ozs).—There are a few drachms of an orange-coloured fluid in the pericardial sac, but no petechiæ on the external surface of the organ. *On section,* there are a few extravasations in the ventricles lying under the endocardial lining*; auricles,* healthy.

Liver weighs 12 lbs. 7 ozs.—The convex surface of the organs shows old symptoms of perihepatitis and is dotted over with small yellow bodies which on *section* are also found to pervade the tissues.

Spleen weighs 6 lbs. 4 ozs.—Is large and the capsule is dotted over with small irregular-shaped ecchymoses. *On section* the tissue is firm and healthy.

Kidneys.—The right weighs 1 lb. 8 ozs. the left 1 lb. 9 ozs. The organs are pale in colour. There are no petechiæ on the surface and the capsules strip easily and on *section* appear healthy though pale.

Stomach presents a healthy appearance on *section.*

Small intestines.—Present a few petechiæ dotted over the surface of the mucous membrane. There is no ulceration and Peyer's patches are healthy. *Large intestines* are healthy.

The chief points of interest in this case are :—

(i). That the disease can be communicated to an animal by inoculation of blood which has remained in the cavities of the heart for sixteen hours after death.

(ii). The course of the pathological changes which succeeded the subcutaneous inoculation of blood from the right and left ventricles in different situations of the same animal. In the one instance septic organisms must have been present and injected with the blood from the left ventricle, whilst aseptic blood was injected from the right.

(iii). The prolonged period of incubation, *viz.* :—Eleven days, which must have been due to the presence of immature forms of the hæmatozoon only in the injected blood.

(iv). The very low body temperature which persisted during the whole course of the case, the highest degree registered being only 38·3°C.

(v). The rapidly fatal termination, which occurred almost immediately after the appearance of the hæmatozoa in the blood.

CASE No. XXIII.—CHESTNUT COUNTRY-BRED HORSE.

30th May, 1891...	Temperature A.M.		Temperature P.M.	37·4°C.	Blood healthy.
31st „ ...	„ „	36·6°C.	„ „	37·8°C.	„ „
1st June ...	„ „	37·4°C.	„ „	37·1°C.	„ „
2nd „ ...	„ „	36·5°C.	„ „	37·5°C.	„ „
3rd „ ...	„ „	37·3°C.	„ „	37·7°C.	„ „

4th.—Temp. A.M. 37·5°C.— 11 A.M.—Inoculated on the right side of the neck with 1 cubic centimetre of blood taken from the heart of Horse No. XXI. Temp. P.M. 37·1°C.

5th.—There is a small raised tumor at the seat of inoculation, about the size of a shilling, which is semi-solid. Temp. A.M. 36·5°C. No hæmatozoa in the blood. Temp. P.M. 37·4°C.

6th.—Temp. A.M. 37°C. No hæmatozoa in the blood. Temp. P.M. 37·2°C.

7th.—The swelling at the seat of inoculation has increased in size and is now 2″ × 1″. Temp. A.M. 36·7°C. No hæmatozoa in the blood. Temp. P.M. 37·4°C.

8th.—The condition of the animal remains unchanged. Temp. A.M. 36·7°C. No hæmatozoa in the blood. Temp. P.M. 37·6°C.

9th.—The swelling at the seat of inoculation has increased in size and now measures 3″ × 2″. It is tense and tender on manipulation. Temp. A.M. 36·5°C. No hæmatozoa in the blood. Temp. P.M. 37·4°C.

10th.—The condition of the animal remains unchanged. Temp. A.M. 36·5°C. There are no hæmatozoa in the blood. Temp. P.M. 37·1°C.

11th.—The condition of the animal remains unchanged. Temp. A.M. 36·7°C. There are no hæmatozoa in the blood. Temp. P.M. 37·5°C.

12th.—The animal looks well and the appetite is good. The tumour is decidedly smaller this morning, and has lost much of its tension and tenderness. Temp. A.M. 36·8°C. Hæmatozoa numerous in the blood. Temp. P.M. 37·8°C.

13th.—Temp. A.M. 40·1°C. Hæmatozoa very numerous in the blood. Temp. P.M. 39·4°C.

14th.—Temp. A.M. 38·9°C. Hæmatozoa very numerous in the blood. Temp. P.M. 38·4°C. There is œdema of the abdominal wall running forward from the sheath to the ensiform cartilage.

15th.—Temp. A.M. 37·5°C. Hæmatozoa swarming in the blood. Temp. P.M. 39·3°C.

16th.—Temp. A.M. 39·2°C. Hæmatozoa swarming in the blood. Temp. P.M. 39·4°C.

17th.—There was bleeding from the right nostril during the night. Temp. A.M. 38·9°C. Hæmatozoa absent from the blood. Temp. P.M. 38·3°C.

18th.—The small capillary vessel in the conjunctiva of the left eye has given way; and the secretion is consequently red in colour. Temp. A.M. 37·4°C. Hæmatozoa absent from the blood. Temp. P.M. 38·8°C.

19th.—On microscopical examination of the blood numerous refractile bodies are seen lying in the open spaces between the rouleaux of corpuscles. Temp. A.M. 38·8°C. Hæmatozoa absent from the blood. Temp. P.M. 38·9°C.

20th.—Temp. A.M. 38.5°C. Hæmatozoa few in the blood. Temp. P.M. 39°C.

21st.—Temp. A.M. 39·6°C. Hæmatozoa very numerous in the blood. Temp. P.M. 38·4°C.

22nd.—Temp. A.M. 38·6°C. Hæmatozoa swarming in the blood. Temp. P.M. 39·1°C.

23rd.—Temp. A.M. 37·7°C. Hæmatozoa very numerous in the blood. Temp. P.M. 38·5°C.

24th.—Temp. A.M. 37·8°C. Hæmatozoa very numerous in the blood. Temp. P.M. 38°C.

25th.—Temp. A.M. 38·2°C. Hæmatozoa very numerous in the blood. Temp. P.M. 38·4°C.

26th.—There is œdema of the most dependent parts of the abdominal wall much more marked, triangular in shape. The base of the triangle is situated in front of the sheath, the apex appearing in front of the chest between the fore-legs. Temp. A.M. 37·3°C. Hæmatozoa very numerous in the blood. Temp. P.M. 39·4°C.

27th.—Temp. A.M. 36·2°C. Hæmatozoa very numerous in the blood. Temp. P.M. 38·4°C.

28th.—Temp. A.M. 37·7°C. Hæmatozoa very numerous in the blood. Temp. P.M. 38·4°C.

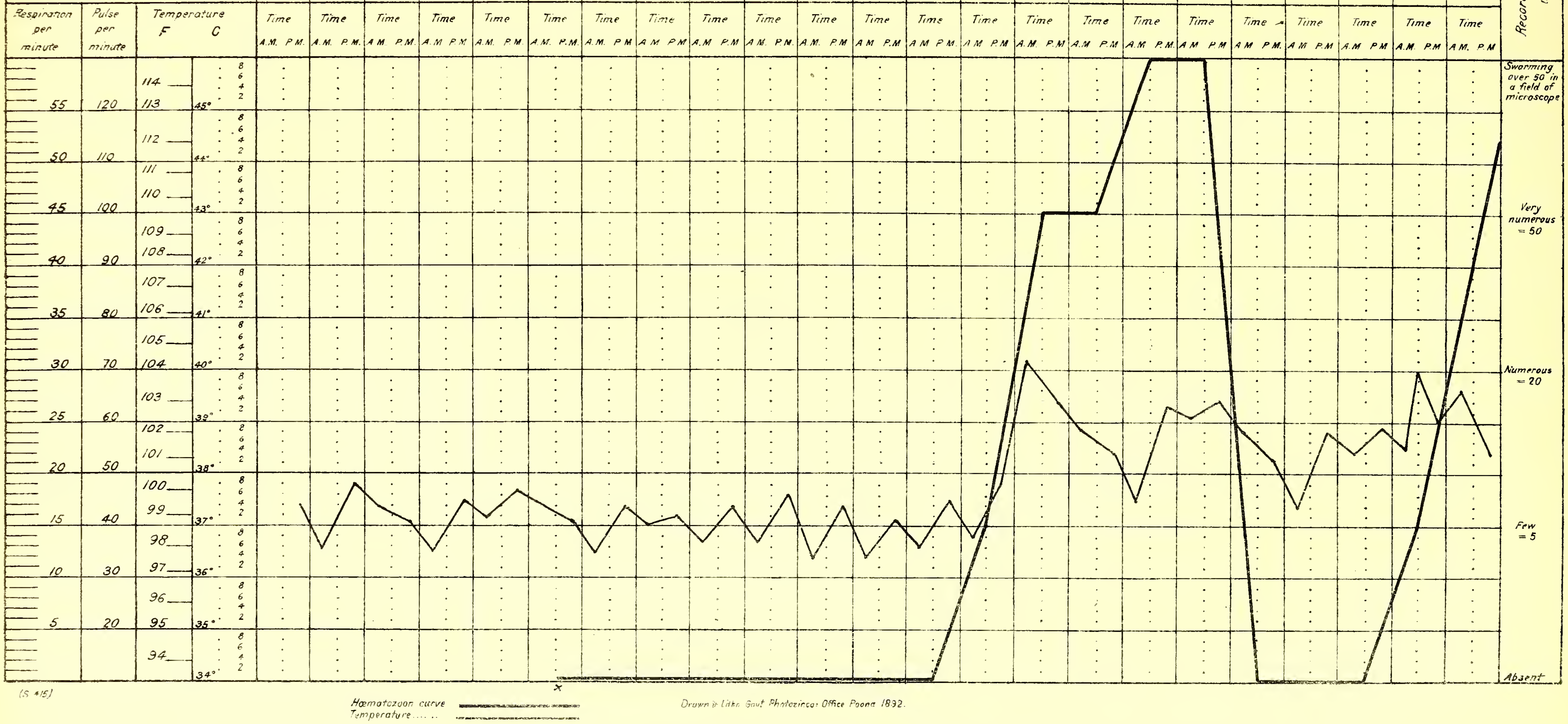
29th.—Temp. A.M. 37·8°C. Hæmatozoa swarming in the blood. Temp. P.M. 37·C°.

30th.—Temp. A.M. 38·1°C. Hæmatozoa very numerous in the blood. Temp. P.M. 37·6°C.

Chestnut Country-bred Horse.

Disease, "Surra" Inoculated. Date of Inoculation, June 4.1891. Result, Death. Date of Result, July. 11.91 Register No. XXIII

Dates of Observation	May 30	31	June 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Days of Disease														1	2	3	4	5	6	7	8	9	10
Organisms in Blood.	—	—	—	—	—	—	—	—	—	—	—	—	—	F	VN	VN	S	S	—	—	—	F	VN



(S. 415)

Drawn & Litho. Govt. Photozinco: Office Poona 1892.

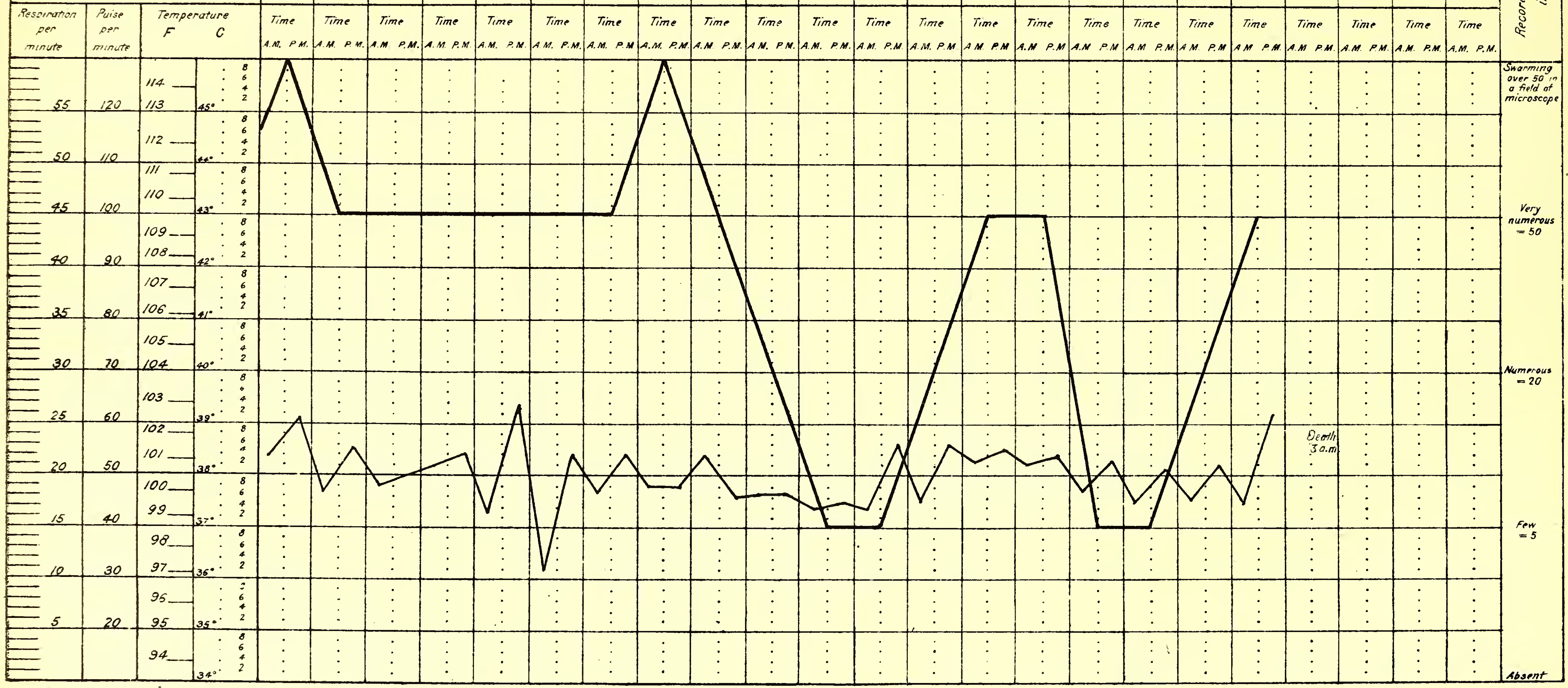
× Inoculated Subcutaneously with 1·0 c.c. of blood taken from the heart of Horse No. XXI.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age, Aged Sex, Male Colour, Chestnut.

Disease, "Surra" Date of Inoculation, June 4.1891. — Result, Death. Date of Result, July 11. 91 — Register No. — XXIII

Dates of Observation.	June 22	23	24	25	26	27	28	29	30	July 1	2	3	4	5	6	7	8	9	10	11			
Days of Disease	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30			
Organisms in Blood.	S	VN	VN	VN	VN	VN	VN	S	VN	N	F	F	N	VN	VN	F	F	N	VN				



(S 415)

Hæmatozoon curve
Temperature .....

Drawn & Litho. Govt. Photozinco: Office Poona 1892.

1st July.—Temp. A.M. 37·7°C. Hæmatozoa numerous in the blood. Temp. P.M. 37·8°C.

2nd.—Temp. A.M. 37·7°C. Hæmatozoa few in the blood. Temp. P.M. 37·7°C.

3rd.—Temp. A.M. 37·5°C. Hæmatozoa few in the blood. Temp. P. M. 38·6°C.

4th.—Temp. A.M. 37·6°C. Hæmatozoa numerous in the blood. Temp. P.M. 38·7°C.

5th.—Yesterday evening, the animal fell and was put in slings. The œdema of the belly and hind limbs has considerably increased, but the appetite is good. Temp. A.M. 38·3°C. Hæmatozoa very numerous in the blood. Temp. P.M. 38·5°C.

6th.—Temp. A.M. 38·3°C. Hæmatozoa very numerous in the blood. Temp. P.M. 38·4°C.

7th—The appetite is failing. Temp. A.M. 37·2°C. Hæmatozoa few in the blood. Temp. P.M. 38·2°C.

8th.—Last night and this morning the animal has eaten his food, but is very weak. Temp. A.M. 37·5°C. Hæmatozoa few in the blood. Temp. P.M. 38·1°C.

9th.—Temp. A.M. 37·5°C. Hæmatozoa numerous in the blood. Temp. P.M. 38·2°C.

10th.—Temp. A.M. 37·5°C. Hæmatozoa very numerous in the blood. Temp. P.M. 39·2°C.

11th.—The animal became worse at 2 A.M., and death took place at 3 A.M.

AUTOPSY—The animal is considerably emaciated, and there is much yellow exudation lying in the subcutaneous tissue underneath the skin of the belly and running back on either side of the sheath and scrotum.

Thorax.—There is no fluid in the pleural cavities, and no adhesions between the visceral and parietal layers of the pleuræ.

Lungs.—The apices and the free borders of both lungs are the seat of emphysema, and there are a few ecchymoses lying scattered over the surface of the lungs under the visceral pleuræ. *On section,* the cut surface presents a reddish-yellow colour. There is no œdema.

Heart.—Large. There is considerable quantity of yellow, jelly-like exudation situated round the base of the organ. Also a few ecchymoses dotted over the base anteriorly and posteriorly. The right side of the organ is filled with dark-red clots floating in the fluid blood. The valves are healthy. The *left auricle* and *ventricle* are distended with dark clot, and although the auricle is healthy, the ventricle presents numerous extravasations under the endocardium, some of which involve the musculi-papillares. The valves are healthy.

Stomach.—The external surface is normal. *On section,* the *cuticular* portion presents a healthy appearance. The *villous* portion presents a raised tumor of mucous membrane, with a depression on its summit, somewhat resembling the crater of a volcano. It is slightly red in colour, and on section, the interior is found to be divided into several compartments separated off by distinct walls, and contains numerous *spiroptera megastoma.*

Spleen.—Weighs 2 lbs. 14 ozs. Is dotted over the surface with dark ecchymoses. *On section* the tissue is firm and healthy.

Kidneys.—Weigh 3 lbs. 3 ozs. together, and are apparently healthy.

Liver.—Is large, firm and puckered on the surface. There are signs of old perihepatitis, but no concretions.

Small Intestines }
Large ,, } Present no abnormality.

Remarks :—

(i). The disease was successfully transmitted by the inoculation of 1 c. c. of blood, from which, the hæmatozoon was absent, taken from the heart 5½ hours after death. The hæmatozoa were swarming in the blood the day previous to death.

(ii). The period of incubation, *i. e.,* the time which elapsed between the inoculation and the first appearance of the hæmatozoon in the general circulation was eight days.

(iii). The period which elapsed between the inoculation of the disease and death, was 37 days.

(iv). The presence of sub-endocardial ecchymoses in the left ventricle, but their absence from the right.

CASE No. XI.– CHESTNUT, COUNTRY-BRED ENTIRE, *aged, healthy and in good condition.*

11th January, 1891.—Inoculated subcutaneously on the off side of the neck with 1 C.C. of blood taken from the heart of Horse No. VIII at 10-30 A.M. ten and a half hours after the death of the animal.

12th.—Temp. A.M. 38·3°C. P.M. 38·7°C. No hæmatozoa observed in the blood.

13th.—Temp. A.M. 37·9°C. P.M. 38·7°C. No hæmatozoa observed in the blood.

14th.—Temp. A.M. 38·2°C. P.M. 38·7°C. No hæmatozoa oberved in the blood.

15th.—Temp. A.M. 37·9°C. P.M. 38·5°C. No hæmatozoa observed in the blood.

16th.—Temp. A.M. 38·2°C. P.M. 38·6°C. No hæmatozoa observed in the blood.

17th.—Temp. A.M. 38·2°C. P.M.38.3°C. No hæmatozoa observed in the blood. Examined two specimens of blood taken in the ordinary way from the muzzle and several (3) small nematodes were observed. Each of the worms appeared to be transparent, having a round pointed tail tapering for some distance ¼th of the whole length, with a blunt and somewhat rounded head.

18th.—Temp. A.M. 37·6°C. P.M. 38·6°C. No hæmatozoa observed in the blood.

19th.—Temp. A.M. 38·3°C. P.M. 38·5°C. No hæmatozoa observed in the blood.

20th.—Temp. A.M. 40·5°C.. P.M. 39·5°C. No hæmatozoa observed in the blood.

21st.—Temp. A.M. 38·9°C. P.M. 38·8°C. No hæmatozoa observed in the blood.

22nd.—Temp. A.M. 38·5°C. P.M. 39·5°C. Hæmatozoa numerous in the blood.

23rd.—Temp. A.M. 38·8°C. P.M. 38·8°C. Hæmatozoa numerous in the blood.

24th.—Temp. A.M. 38·5°C. P.M. 38·7°C. Hæmatozoa numerous in the blood.

25th.—Temp. A.M. 38·1°C. P.M. 38·1°C. No hæmatozoa observed in the blood.

26th.—Temp. A.M. 38·5°C. P.M. 38·8°C. One hæmatozoon observed in two specimens of blood.

27th.—Temp. A.M. 37·7°C. P.M. 38·7°C. No hæmatozoa observed in the blood, but in two coverglass preparations two nematodes similar to those observed on the 17th instant were found.

28th.—Temp. A.M. 38·3°C. P.M. 38·4°C. No hæmatozoa observed in the blood.

29th. Temp. A.M. 39·1°C. P.M. 38·2°C. Hæmatozoa few in the blood and one nematode worm also observed.

30th.—Temp. A.M. 38·6°C. P.M. 38·5°C. Hæmatozoa numerous in the blood.

31st.—Temp. A.M. 38·2°C. P.M. 39·3°C. Hæmatozoa numerous in the blood and one nematode worm also observed.

1st February.—Temp. A.M. 40·1°C., p.m. 40°C. Hæmatozoa numerous in the blood.

2nd.—Temp. A.M. 39·7°C., P.M. 39·9°C. Hæmatozoa few in the blood and one nematode also observed. Patient is becoming emaciated. No petechiæ on the conjunctival membranes nor defluxion from the eyes nor nostrils.

3rd.—Temp. A.M. 39·6°C., P.M. 39·9°C. Hæmatozoa few in the blood.

4th.—Temp. A.M. 39·5°C., P.M. 38·4°C. Hæmatozoa numerous in the blood.

5th.—Temp. A.M. 38·3°C., P.M. 38·6°C. Hæmatozoa numerous in the blood.

6th.—Temp. A.M. 41·6°C., P.M. 40·8°C. Hæmatozoa numerous in the blood.

7th.—Temp. A.M. 38·7°C., P.M. 38·9°C. Hæmatozoa few in the blood.

8th.—Temp. A.M. 38·7°C., P.M. 39·9°C. No hæmatozoa observed in the blood.

9th.—Temp. A.M. 38°C., P.M. 38·8°C. Hæmatozoa few in the blood.

10th.—Temp. A.M. 38°C., P.M. 38·9°C. Hæmatozoa numerous in the blood.

11th.—Temp. A.M. 38·7°C., P.M. 38·9°C. Hæmatozoa very numerous in the blood.

12th.—Temp. A.M. 40·2°C., P.M. 40·1°C. No hæmatozoa observed in the blood.

13th.—Temp. A.M. 38°C., P.M., 39·6°C. No hæmatozoa observed in the blood.

14th.—Temp. A.M. 38°C., P.M. 38·8°C. No hæmatozoa observed in the blood.

15th.—Temp. A.M. 38·4°C., P.M. 38·6°C. No hæmatozoa observed in the blood.

16th.—Temp. A.M. 39·5°C., P.M. 39·1°C. No hæmatozoa observed in the blood.

17th.—Temp. A.M. 39·1°C., P.M. 39·4°C. Hæmatozoa few in the blood.

18th.—Temp. A.M. 39·3°C., P.M. 39·2°C. Hæmatozoa numerous in the blood.

19th.—Temp. A.M. 39·4°C., P.M., 39·5°C. Hæmatozoa few in the blood.

20th.—Temp. A.M. 38·5°C., P.M. 38·5°C. No hæmatozoa observed in the blood.

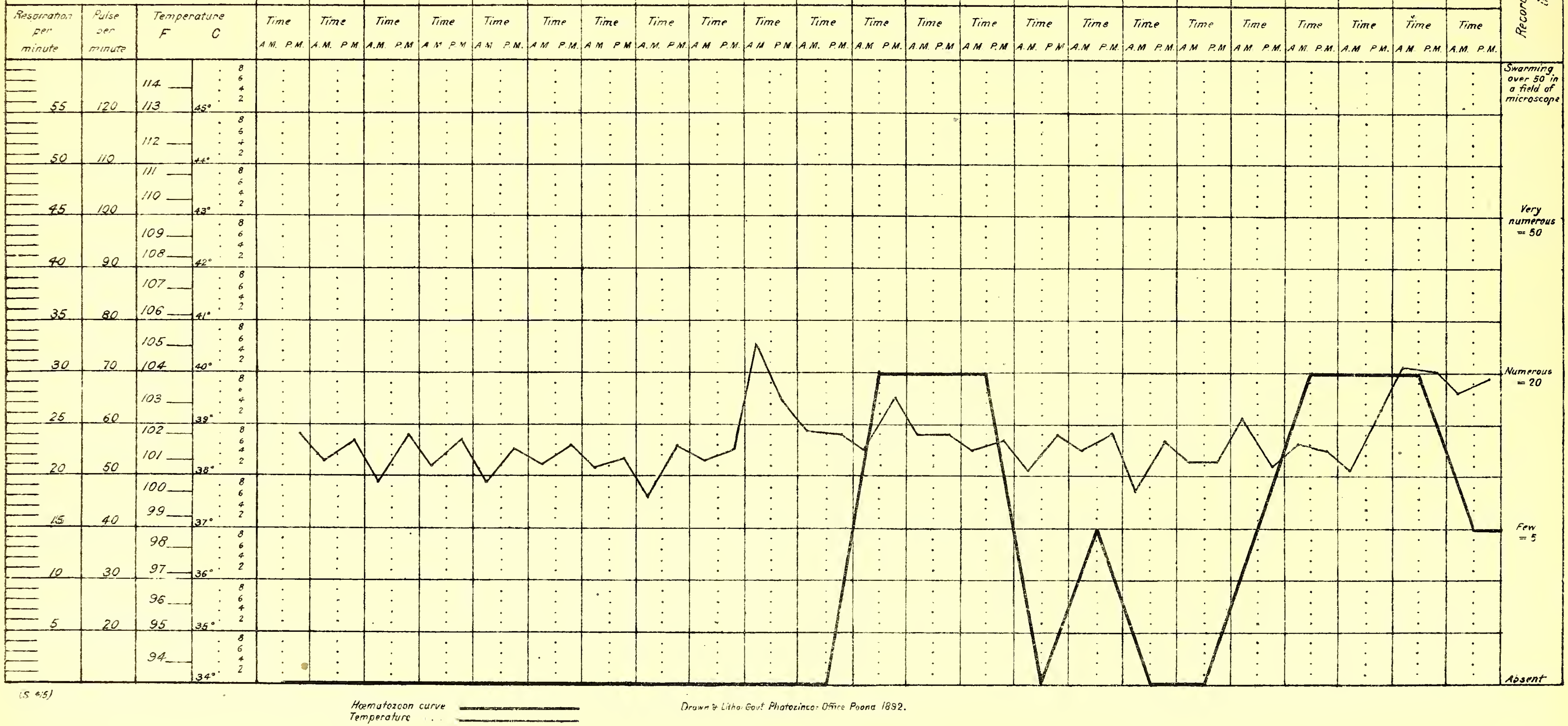
21st.—Temp. A.M. 39·6°C., P.M. 39·8°C. Hæmatozoa numerous in the blood.

22nd.—Temp. A.M. 39·4°C., P.M. 39·5°C. No hæmatozoa observed in the blood.

Chestnut Country-bred Entire — Age, Aged — Sex, Entire — Colour, Chestnut

Disease. Inoculated Horse 'Surra' — Date of Inoculation, 11. 1. 91. — Result, Death — Date of Result, 25. 2. 91. Register No. XI

Dates of Observation.	Jan. 11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Feb. 1	2
Days of Disease												1	2	3	4	5	6	7	8	9	10	11	12
Organisms in Blood	—	—	—	—	—	—	—	—	—	—	—	N	N	N	—	F	—	—	F	N	N	N	F



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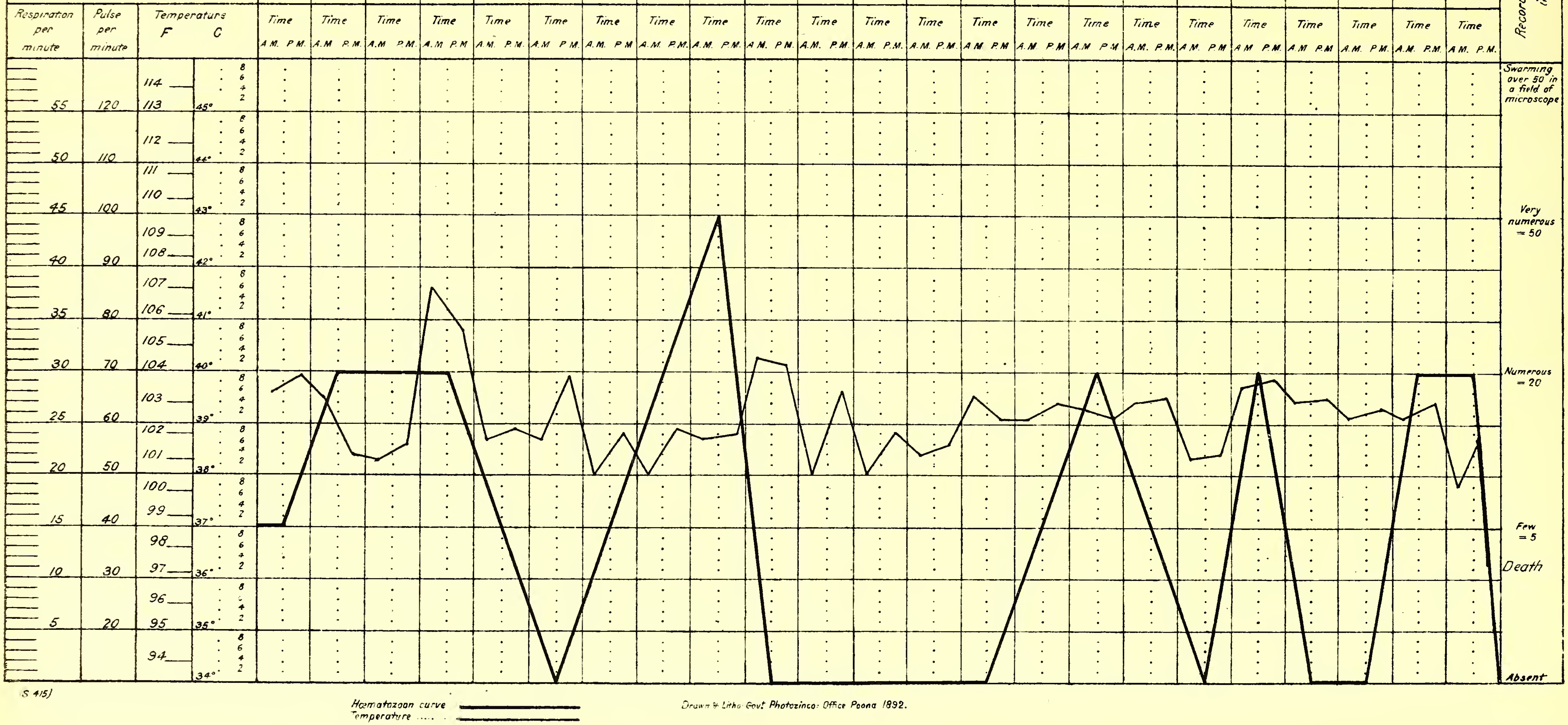
RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age Sex Colour

Disease Date of Attack Result Date of Result Register No. XI

Dates of Observation.	Feb. 3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Days of Disease	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Organisms in Blood	F	N	N	N	F	—	F	N	VN	—	—	—	—	—	F	N	F	—	N	—	—	N	N
Time	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.	A.M. P.M.



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23rd.—Temp. A.M. 39·1°C., P.M. 39·3°C. No hæmatozoa observed in the blood.

24th.—Temp. A.M. 39·1°C., P.M. 39·4°C. Hæmatozoa numerous in the blood.

25th.—Temp. A.M. 37·8°C., P.M. 36·3°C. Hæmatozoa numerous in the blood. Death took place at 8 P.M.

AUTOPSY at 9-30 A.M., February 26th, 1891.

The body is considerably emaciated, especially the glutei muscles. There is some blood-stained fluid, about a pint, in the right pleural cavity.

Lungs quite free, no adhesions of the parietal and visceral pleuræ. Superior surface of the right lung is somewhat dark in colour and is dotted over with petechiæ about twenty in number and varying from $\frac{1}{8}$th to $\frac{1}{3}$rd of an inch in diameter. The apex presents well marked emphysema. *Posteriorly* there are a few small, hard nodules, which on section are found to be either caseous or calcareous. *On section* the lung is somewhat yellowish in colour and on pressure mucus exudes from the cut surfaces.

Left lung presents a similar condition but fewer nodules and ecchymoses.

Liver, small, very slight old perihepatitis on the convex surface of the right lobe. There are no calcareous nodules.

Spleen.—There are a few petechiæ on the surface lying under the capsule.

Kidneys.—The capsules strip easily, the stellate veins are injected. *On section*, there is a certain amount of orange material present, in some of the pyramidal tubes.

Stomach.—There are a few small isolated patches on the mucous membrane of the greater curvature, slightly red in colour, but there is no sign of ulceration. A nodule, the size of a walnut, is seen lying free in the great omentum.

Heart.—The heart is large, the right auricle and ventricle are collapsed. There are a few small irregular shaped extravasations lying under the visceral pericardium. The wall of the *right ventricle* is somewhat hypertrophied and the cavity dilated. *Left ventricle* contracted, its walls are $2\frac{1}{2}''$ in thickness at the widest part. Lying beneath the endocardium there are numerous and extensive extravasations of blood, as seen in some previous cases; the musculi-papillares are most involved. The valves are healthy.

The chief points of interest in the case are:—

(i). That the blood used for the inoculation of the animal had been left in the heart of the dead animal for $10\frac{1}{2}$ hours before it was injected.

(ii). The lengthy period of incubation of the disease, *viz.*, 11 days. The length of time taken in this case can no doubt be accounted for by the death of hæmatozoon before inoculation so that the immature or resting form, whatever it may be, in this case had to mature and reproduce the disease.

(iii). The phenomenal and rapid rise of the temperature on the 15th day of the disease, attaining its highest point on the morning of the 16th, without any great increase in the number of hæmatozoa in the blood.

(iv). The irregularity of the temperature and the number of hæmatozoa in the blood throughout the course of this case; the height of the temperature and the number of hæmatozoa present in the blood, bore, as far as one can see, no ratio or direct relation, the one to the other.

CASE No. XXXII.—LIGHT CHESTNUT C. B. HORSE, *aged, and fairly healthy.*

9th July, 1891.—Temp. A.M. — P.M. 36·7°C. Blood healthy.

10th.—Temp. A.M. 36·4°C., P.M. 36·8°C. Blood healthy.

11th.—Temp. A.M. 35·8°C., P.M. 37·1°C. Blood healthy.

The animal was inoculated subcutaneously over the left shoulder with ·3 C.C. of blood taken from the right ventricle of the heart of Horse No. XXIII, eight hours after death. The injected blood on the previous day contained very numerous hæmatozoa.

12th.—The animal appears in good health. There are no petechiæ on the conjunctival membranes, the appetite is very good and the evacuations are normal in character. Temp. A.M. 36·2°C. There are no hæmatozoa in the blood. Temp. P.M. 37·1°C.

13th.—The condition of the animal is unchanged. Temp. A.M. 36°C. There are no hæmatozoa in the blood. Temp. P.M. 37°C.

14th.—Condition unchanged. Temp. A.M. 36°C. There are no hæmatozoa in the blood. Temp. P.M. 36·3°C.

15th.—Condition unchanged, with this exception that there is a very slight amount of swelling and œdema at the seat of inoculation. Temp A.M. 35·5°C. There are no hæmatozoa in the blood. Temp. P.M. 36·3°C.

16th—There is no increase in the swelling and œdema at the seat of inoculation and the condition of the animal is unchanged. Temp. A.M. 35·4°C. No hæmatozoa in the blood. Temp. P.M. 36·4°C.

17th.—Condition unchanged. Temp. A.M. 35·6°C. No hæmatozoa in the blood Temp. P.M. 36·5°C.

18th.—Condition unchanged. Temp. A.M. 35·7°C. No hæmatozoa in the blood. Temp. P.M. 36·7°C.

19th.—There has been no increase in swelling or œdema at the seat of inoculation since the 16th instant and the condition of the animal remains unaltered. Temp. A.M. 36·1°C. No hæmatozoa in the blood. Temp. P.M. 37·3°C.

20th—This morning the swelling has decreased in size at the seat of inoculation, the animal appears in the same condition, the appetite is good, there are no conjunctival petechiæ and the evacuations are normal in character. Temp. A.M. 37·3°C. The hæmatozoa are numerous in the blood. Temp. P.M. 38°C.

21st.—At six o'clock this morning the animal showed signs of weakness, but was able to stand without assistance. It shortly afterwards lay down, and rapidly becoming worse, died at 8·30 A.M. Temp. A.M. 37·1°C. Up to the last the animal continued to eat and during the night had consumed the greater part of its coarse hay bedding.

AUTOPSY at 10 A.M.—The body is tolerably well nourished, there is no swelling or œdema of the sheath, abdominal walls or at the point of inoculation on the left shoulder.

Thorax.—The pleural cavities are free from fluid and the pleuræ from adhesions.

Lungs are large, well filled with air, and dotted over with small extravasations of blood, for the most part of the size of a two-anna piece.

On section, blood flows freely from the cut surfaces, and the tissue appears healthy.

Heart.—Weighs 4 lbs. 7 ozs., is large, numerous petechiæ are dotted over the surface of the muscular tissue, but all lie under the visceral pericardium. The right side is distended with bood, but the left is contracted.

The *right auricle* contains some dark blood clots and a few petechiæ (sub-endocardial). The *right ventricle* is distended with dark and decolourized clots and there are very numerous extravasations of blood, some of them measuring ¼th to ½ of an inch in length, lying under the endocardial lining.

The *left auricle* contains a small quantity of dark fluid blood, but no pathological changes. The *left ventricular* walls are hypertrophied, contain a little clot, and numerous extravasations, several large in size. All the valves are healthy.

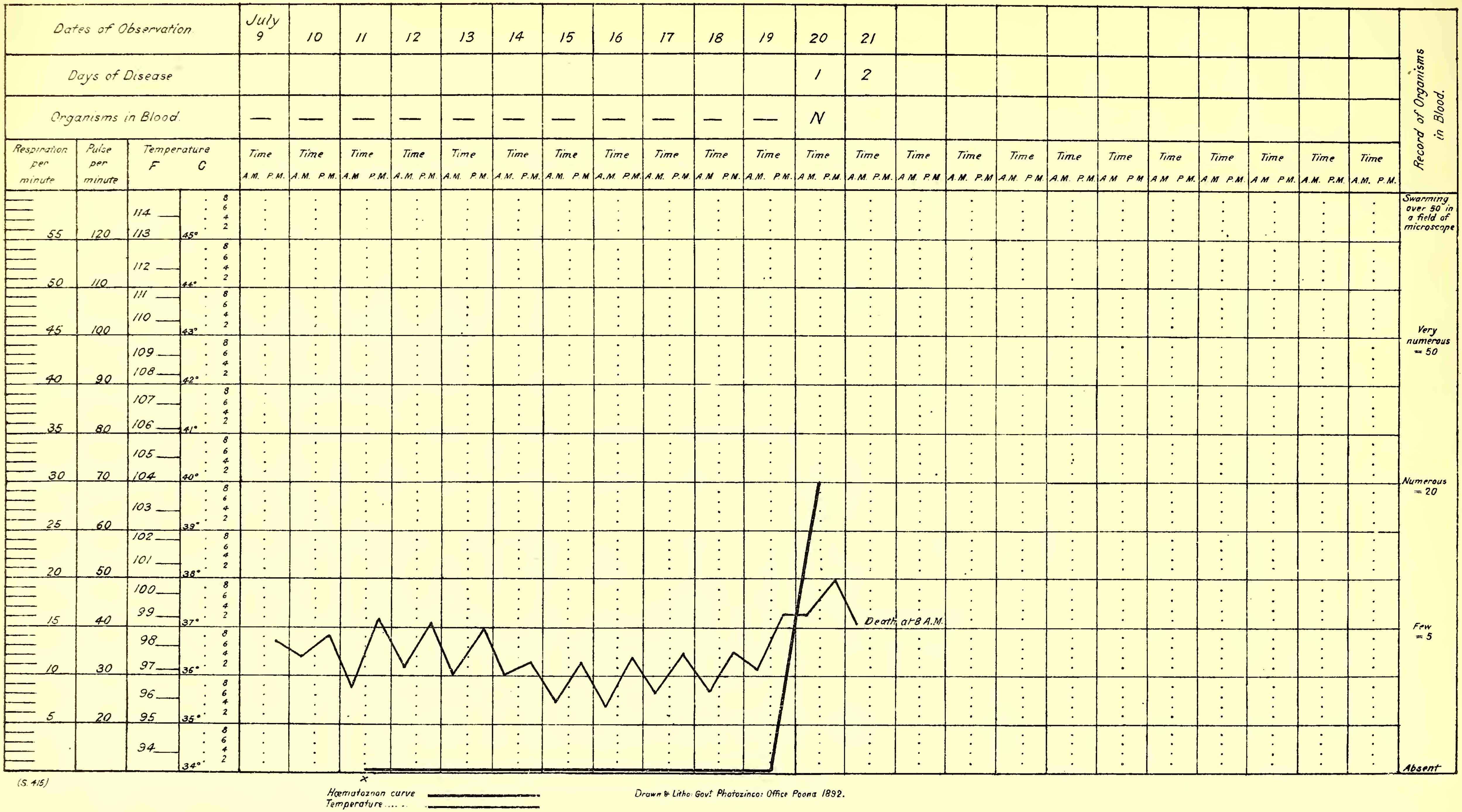
Liver is small, there are some changes denoting perihepatitis of old date, and also a few small, round, calcareous bodies lying beneath the capsule on the convex surface of the organ. *On section,* the tissues are dark in colour, but no calcareous bodies are seen pervading its substance.

Stomach.—The external surface presents nothing pathological. *On section,* it contains some semi-digested food. The *cuticular* portion is healthy in appearance, but the

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Light chestnut coloured Country-bred Gelding — Age, Aged — Sex, Gelding — Colour, Light chestnut

Disease Inoculated Horse "Surra" — Date of Inoculation, 11. 7. 91. — Result, Death. — Date of Result, 21. 7. 91. — Register No. XXXII.



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x inoculated Subcutaneously 0·3 cc of blood taken from the right ventricle of the heart of horse No. XXIII.

mucous membrane of the *villous* portion is somewhat thickened and presents two patches, lying midway between the line of demarcation and the pylorus. These patches are somewhat circular in form and are of a darkish-red colour, about one inch in diameter and slightly raised above the surrounding portion of the mucous membrane. *On section,* these patches are found to involve only the superficial portion of the mucous membrane.

Spleen is normal in size, petechiæ are thickly dotted over the convex surface of the capsule. *On section,* the tissue is firm and healthy in appearance.

Kidneys are pale in colour, the capsules strip easily. There are a few petechiæ lying under the capsules, dark brick-red in colour. *On section* the petechiæ do not appear to involve the substance of the cortical portion of the organ.

Intestines present nothing pathological.

The points of interest in this case are :—

(i). That the disease was successfully transmitted by the inoculation of ·3 c.c. of blood taken from the right ventricle of the heart, eight hours after death. The blood contained numerous hæmatozoa on the evening previous to the death of the animal.

(ii). The period of incubation, *i. e.,* the time which elapsed between the subcutaneous inoculation of the animal and first appearance of the hæmatozoon in the blood, was nine days.

(iii). The short period which elapsed, (24 hours) between the first appearance of the hæmatozoon in the blood of the general circulation and the death of the animal.

(iv). The pathological (sub-endocardial) lesions found in the Right and Left ventricles.

CASE No. VII.—WHITE COUNTRY-BRED HORSE *in good condition and healthy.*

Temp. before inoculation was as follows :—

8th December, 1890.—P.M. 37·7°C.

9th.—Temp. A.M. 37·6°C. P.M. 37·7°C.

10th.—Inoculated in the Sternal Region with serum which separated after coagulation of the blood taken from the heart of Horse No. III. 1 c. c. was injected. Temp. A.M. 37·4°C. P.M. 37·7°C.

11th.—Temp. A.M. 37·9°C. P.M. 37·9°C.

12th—Temp. A.M. 37·9°C. P.M. 37·7°C.

13th.—Temp. A.M. 38·5°C. P.M. 39·1°C. No hæmatozoa observed in the blood.

14th.—Temp. A.M. 37·3°C. P.M. 38·3°C. No hæmatozoa observed in the blood.

15th.—Temp. A.M. 37·5°C. P.M, 38·2°C. No hæmatozoa observed in the blood.

16th.—Temp. A.M. 37·3°C. P.M. 38·1°C. No hæmatozoa observed in the blood.

17th.—Temp. A.M. 37·7°C. P.M. 39·3°C. No hæmatozoa observed in the blood.

18th.—Temp. A.M. 39·6°C. P.M. 39·2°C. Hæmatozoa numerous in the blood.

19th.—Temp. A.M. 39·5°C. P.M. 40·3°C. Hæmatozoa very numerous in the blood.

20th.—Temp. A.M. 39·7°C. P.M. 40·5°C. Hæmatozoa very numerous in the blood.

21st.—Temp. A.M. 38·5°C. P.M. 40·5°C. Hæmatozoa numerous in the blood.

22nd.—Temp. A.M. 38·5°C. P.M. 40·9°C. Hæmatozoa few in the blood.

23rd.—Temp. A.M. 40°C. P.M. 40·7°C. The animal fell and was unable to rise ; he was consequently placed in slings ; all four limbs are œdematous. There are numerous large petechiæ on the conjuntivæ. Hæmatozoa few in the blood.

24th.—Temp. A.M. 38·8°C. P.M. 38·9°C. Hæmatozoa numerous in the blood.

25th.—Temp. A.M. 38·6°C. P.M. 40·1°C. Hæmatozoa numerous in the blood.

26th.—Temp. A.M. 38·6°C. P.M. 40·1°C. Hæmatozoa numerous in the blood. The œdema and swelling of the limbs have increased as also the œdema which has appeared under the abdomen and extends between the fore-legs.

27th.—Death at 6·30 A.M.

AUTOPSY at 10 A.M. Body emaciated. Yellow exudation under the skin of the abdomen and chest.

Lungs.—The external surface of the right lung presents numerous petechiæ. There are thrombi in the small veins. There is a circumscribed patch of yellow jelly lying under the visceral pleuræ on the upper surface of the organ.

Left Lung.—Is the seat of hypostatic congestion and there is consolidation at the base running forward for several inches.

The *pericardial sac* contains about 8 ounces of opaque yellow fluid.

Heart.—The large vessels are surcharged with blood which during the *post mortem* became coagulated.

Right ventricle.—There are numerous extravasations lying under the endocardium, more especially in the upper half of the ventricle and they are most marked on the summits of the musculi-papillares. The valves are healthy.

Left ventricle.—Hypertrophied ; the lower third presents very few extravasations but a considerable amount of calcareous deposit under the endocardium. The upper ⅔rds present identically the same pathological changes as the right ventricle, but to a greater extent. The left auricle contained patches of atheroma.

Liver.—Glisson's capsule presents an opalescent appearance and signs of old perihepatitis. The surface is covered with white tubercle-like spots which are slightly raised. This condition is most noticeable in the middle lobe. These spots in a few cases have undergone caseation. *On section,* the upper ⅔rds of the Liver substance presents a friable appearance, the lobules being difficult to make out, but in the lower third they are pale and easily discernible.

Spleen.—Presents numerous petechiæ on its surface. The narrow extremity is studded with extravasations which are raised above the surface. There are in the gastro-splenic omentum a number of enlarged glands which are soft and friable. *On section,* the spleen tissue is firm in consistency and presents a normal appearance.

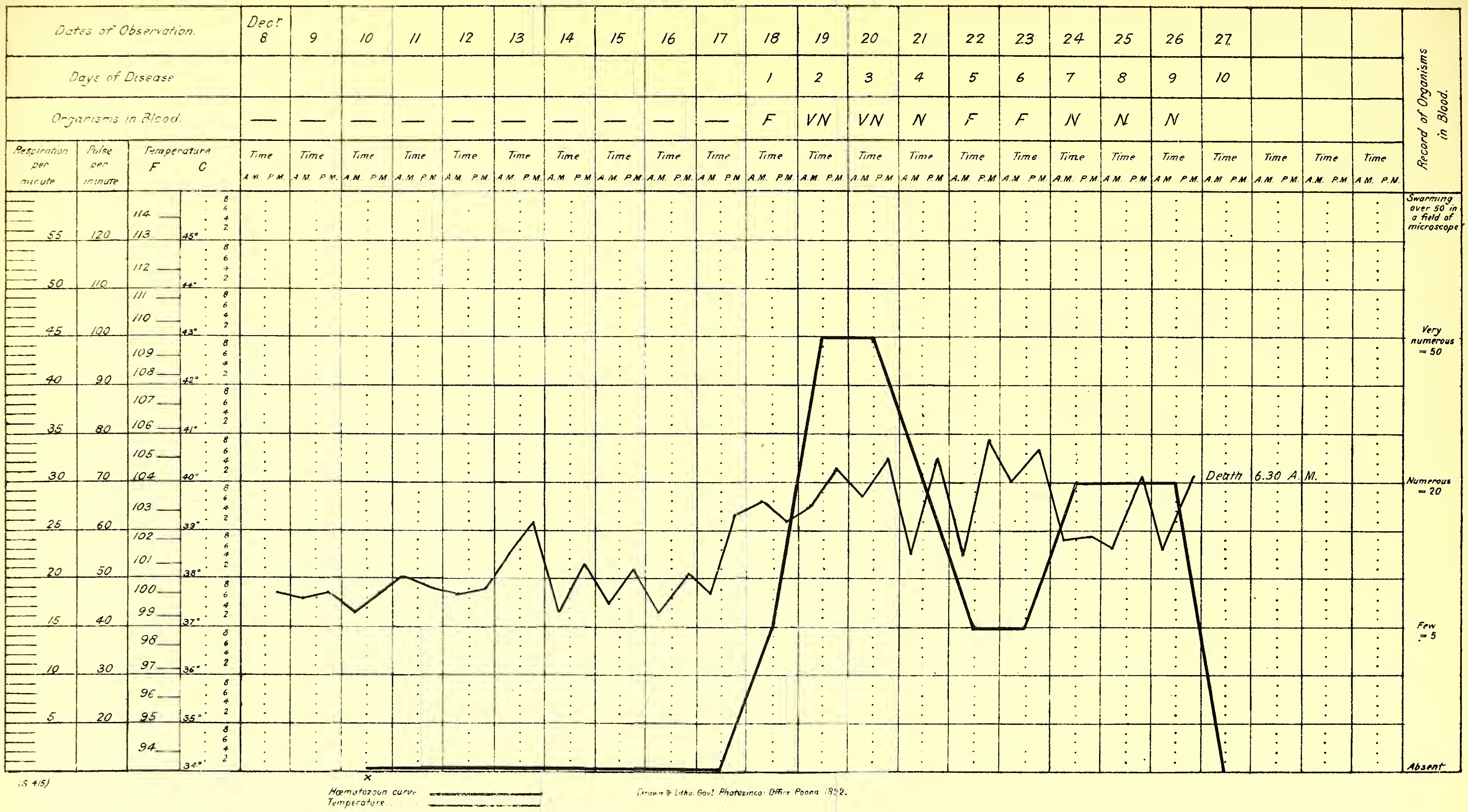
Kidneys.—Small petechiæ, the size of pins' heads and dark red in colour are scattered over the external surfaces and *on section*, are also found to be scattered through the cortical substance. On the surface of the left kidney and extending for some distance into the cortical substance was a patch of extravasation, oblong in shape and about ½″ × ¼″ in size.

Stomach.—Contracted to about ⅙th of its normal dimensions, and quite empty. The *cuticular* portion is normal with the exception of slight yellow staining on the villous portion there were found a number of colonies of parasites (*Spiroptera Megastoma.*) The coats of the stomach are thickened and at the pylorus at least ¾″ in thickness. One patch of ecchymosis is situated on the *villous* portion about an inch from its line of demarcation.

Bladder.—Is contracted and contains about 6 ounces of viscid urine. On the base of the bladder were noticed petechiæ in fine spots forming a cluster.

Remarks.—This animal was inoculated with serum from the blood of Horse No. III on the 10th December and on the 18th the hæmatozoa were few in the blood and the temperature was very slightly elevated. On the 19th and 20th the hæmatozoa were very numerous in the blood and the temp. rose to 40·3°C. On the 21st the hæmatozoa were numerous in the blood and on the 22nd and 23rd few. On the 23rd a Ram was inoculated with blood taken from the Jugular Vein. During the next three days the hæmatozoa were numerous in the blood and the temp. oscillated between 38·6°C and 41·20°C. Death occurred on the morning of the 27th. The point of interest in this case is that the serum from coagulated blood of an animal suffering from Surra is capable of producing the disease when inoculated into a healthy animal, some hours after death.

Disease, Inoculated Horse "Surra" Date of Inoculation, 10 . 12 . 90. Result, Death Date of Result, 27. 12 . 90. Register No. VII



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× Subcutaneous inoculation of 1·0cc of blood Serum taken from Horse No. III.

APPENDIX VI.

EXPERIMENTAL CASES.

SUBCUTANEOUS INOCULATION OF BLOOD PREVIOUSLY PASSED THROUGH THE GOAT.

HORSES Nos. XXXIII, XXXIV, INOCULATED WITH *ANTE-MORTEM* FLUIDS.

HORSES Nos. XXXVIII, XLI, XL, XXXI, L, INOCULATED WITH BLOOD OBTAINED *POST-MORTEM*.

CASE No. XXXIII.—BROWN C. B. ENTIRE HORSE, *aged but in good condition and healthy.*

23rd July, 1891.—Temp. A.M.——P.M. 38·1°C. Blood healthy.

24th.—Temp. A.M. 37·6°C. P.M. 36·5°C. Blood healthy.

25th.—Temp. A.M. 36·1°C. P.M. 36·6°C. Blood healthy.

12 *noon.*—Inoculated subcutaneously over the left Scapular Region with 1 c.c. of serous fluid taken from the left *tunica vaginalis* of Goat No. III. The serous fluid on microscopical examination presents numerous large and active hæmatozoa.

26th.—Temp. A.M. 36·2°C. The blood contains no hæmatozoa. Temp. P.M. 36·8°C.

27th.—There is no sign of swelling or œdema at the point of inoculation. Temp. A.M. 36·1°C. The blood contains no hæmatozoa. Temp. P.M. 37°C.

28th.—Temp. A.M. 37°C. The blood contains no hæmatozoa. Temp. P.M. 37·1°C.

29th.—There is a small raised swelling at the point of inoculation, 1·5″ × 1″. Temp. A.M. 36·2°C. The blood contains no hæmatozoa. Temp. P.M. 36·8°C.

30th.—The swelling has somewhat increased in size with somewhat less tenderness on pressure. Temp. A.M. 36·7°C. Hæmatozoa few in the blood. Temp. P.M. 37°C.

31st.—Temp. A.M. 38·1°C. Hæmatozoa very numerous in the blood. Temp. P.M. 38·2°C.

1st August.—The body is covered with a peculiar Urticarial form of eruption of the skin, especially well marked on each side of the neck, shoulders, flanks and rump. The skin presents very numerous raised patches varying in size from an eight-anna piece to patches 3″ × 1½″. These lie densely, covering the skin and are circular or oval in form, the larger ones raised as much as 1½ inches above the level of the surrounding tissue. These patches are particularly large over the skin extending from the angle of the jaw, along the course of the trachea, to the root of the neck. On the rump and flanks the patches are smaller averaging the size of an eight-anna piece. The skin around the eyes, is œdematous, especially the lower lids; the legs and feet are also swollen and œdematous. The testicles are increased in size and the sheath œdematous. This eruption lasted the whole day, and commenced to disappear during the evening. Temp. A.M. 38·5°C. Hæmatozoa swarming in the blood. Temp. P.M. 38·7°C.

2nd.—The eruption has entirely disappeared, leaving no trace behind. Temp. A.M. 38·7°C. Hæmatozoa very numerous in the blood. Temp. P.M. 39·1°C.

3rd.—Temp. A.M. 38·5°C. Hæmatozoa very numerous in the blood. Temp. P.M. 40·1°C.

4th.—The conjunctivæ and membranæ nictitantes are quite purple in colour, the effect of the numerous extravasations of blood becoming confluent. The secretion collected at the inner canthi is blood-stained and contains hæmatozoa. Temp. A.M. 39·1°C. Hæmatozoa swarming in the blood. Temp. P.M. 39·7°C.

5th.—Both testicles are considerably increased in size. Temp. A.M. 40°C. Hæmatozoa very numerous in the blood. Temp. P.M. 39·8°C.

6th.—Temp. A.M. 39°C. Hæmatozoa few in the blood. Temp. P.M. 39·6°C.

7th.—Temp. A.M. 40°C. Hæmatozoa absent from the blood. Temp. P.M. 38·6°C.

8th.—Temp. A.M. 38·2°C. Hæmatozoa few in the blood. Temp. P.M. 38·5°C.

9th.—Temp. A.M. 38·4°C. Hæmatozoa very numerous in the blood. Temp. P.M. 38·7°C.

10th.—Temp. A.M. 39·8°C. Hæmatozoa swarming in the blood. Temp. P.M. 39°C.

11th.—Temp. A.M. 38·5°C. Hæmatozoa very numerous in the blood. Temp. P.M. 38·5°C.

12th.—Temp. A.M. 37·1°C. Hæmatozoa very numerous in the blood. Temp. P.M. 38·3°C.

13th.—Temp. A.M. 37·8°C. Hæmatozoa swarming in the blood. Temp. P.M. 38·4°C.

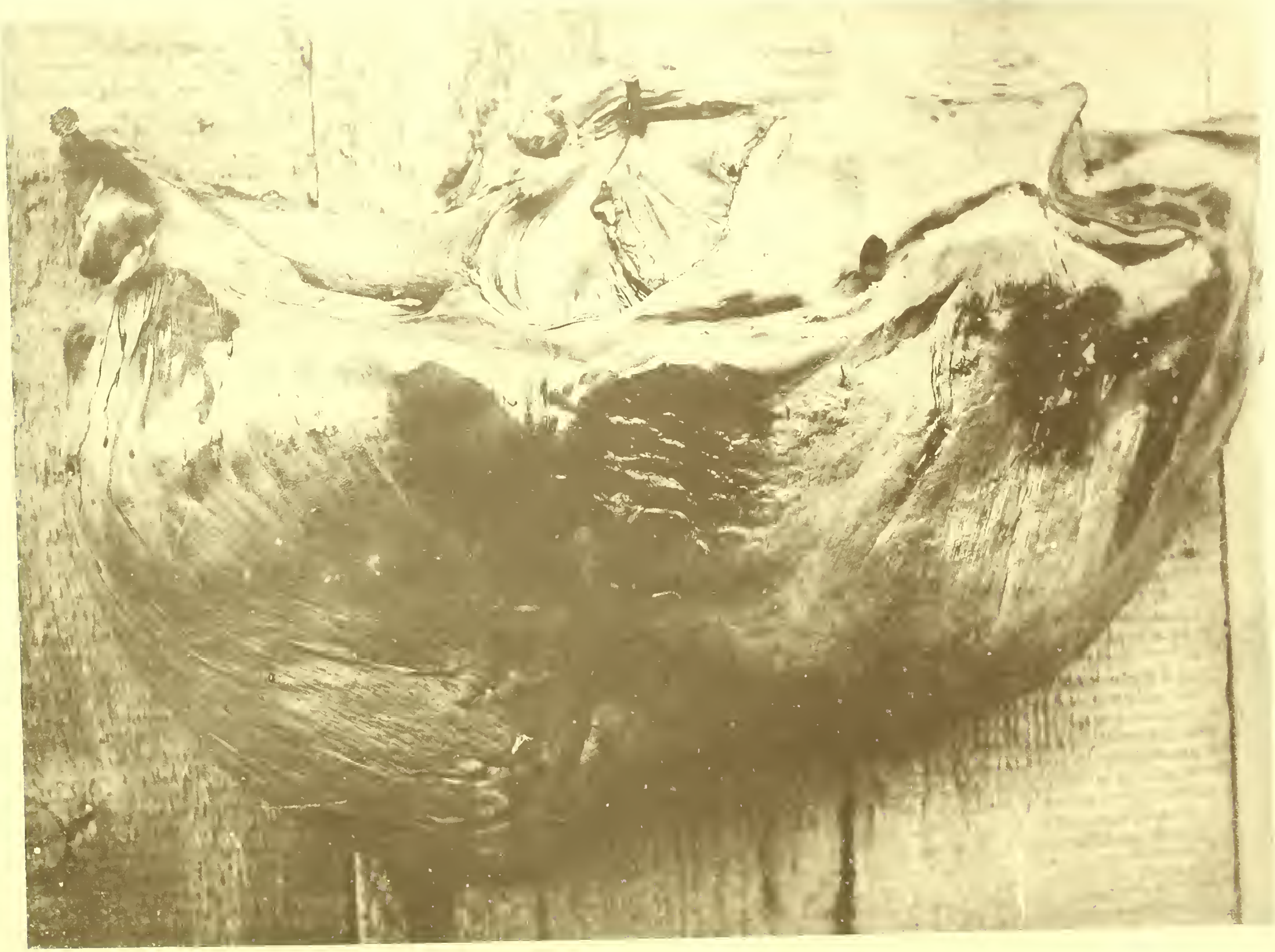
14th.—Temp. A.M. 38°C. Hæmatozoa very numerous in the blood. Temp. P.M. 39·2°C.

15th.—The animal is becoming very weak and the visible mucous membranes very pale and anæmic. Temp. A.M. 39·1°C. Hæmatozoa swarming in the blood. Temp. P.M. 38·3°C.

16th.—The animal was found dead this morning at 6 o'clock.

AUTOPSY at 10 A.M. The body is somewhat emaciated; lower limbs are swollen and œdematous (nearly solid œdema).

Thorax.—There is no fluid in the pleural cavities, nor adhesions of the pleuræ.



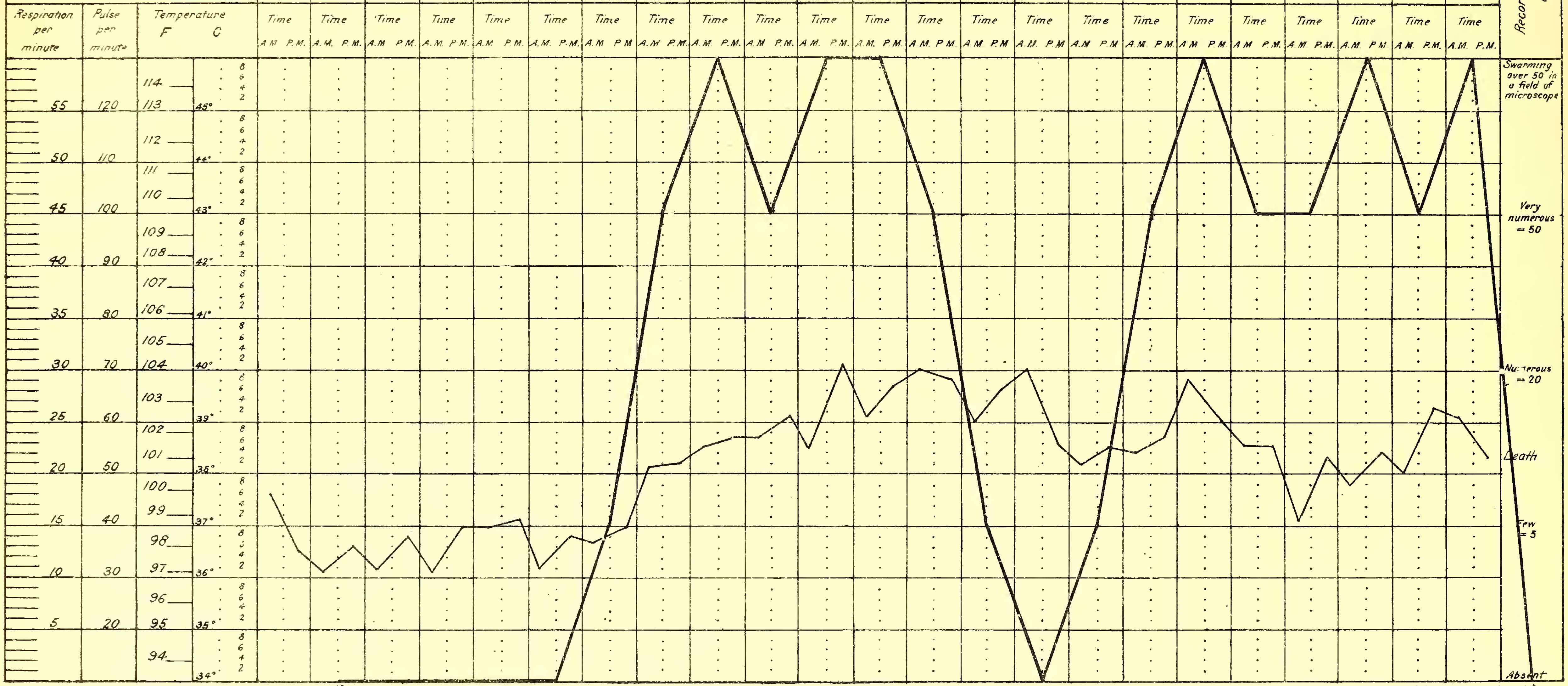
HORSE NO. XXXIII.

EXTERNAL SURFACE OF THE HEART. SUBPERICARDIAL EXTRAVASATIONS OF BLOOD.

Country-bred Entire ______ Age, Aged ____ Sex, Entire ______ Colour, Brown ______

Disease, 'Surra' inoculated ______ Date of Inoculation, 25 July 1891 ____ Result, Death ______ Date of Result, 15. 8. 1891 __ Register No. XXXIII ______

Dates of Observation.	July 24	25	26	27	28	29	30	31	Aug. 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Days of Disease							1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Organisms in Blood		—	—	—	—	—	F	VN	S	VN	S	S	VN	F	—	F	VN	S	VN	VN	S	VN	S



(S 415)

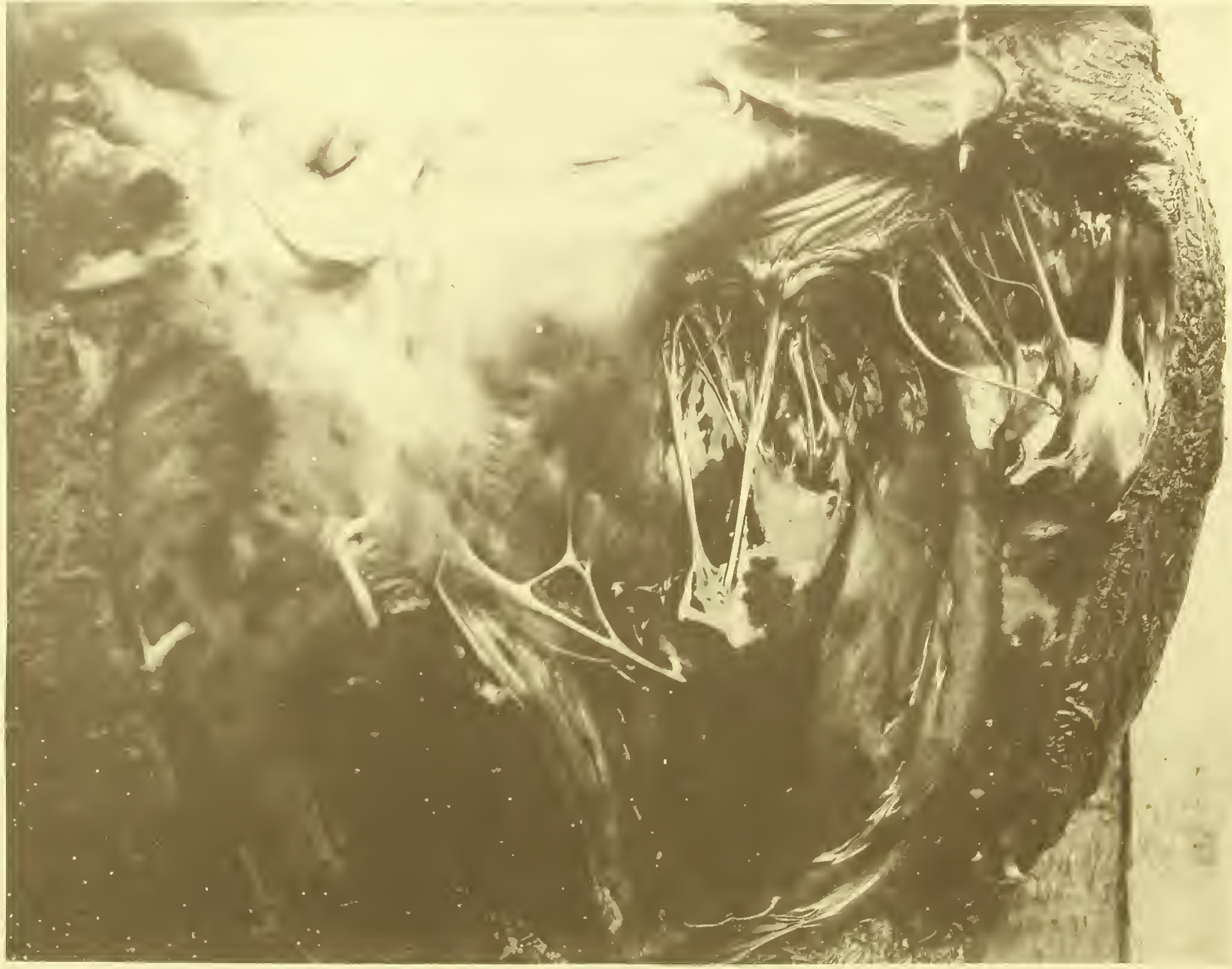
4 hours after Death.

Hæmatozoon curve

Temperature ......

Drawn & Litho: Govt. Photozinco: Office Poona 1892.

X Subcutaneously inoculated with 1·0 cc. of serous fluid taken from the tunica vaginalis testis of Goat No. 1.



HORSE NO. XXXIII.

SUB-ENDOCARDIAL EXTRAVASATIONS OF BLOOD INVOLVING THE LEFT VENTRICLE, SOME ARE LYING UPON THE MUSCULIPAPILLARES.

Lungs.—Are pale and dotted over with extravasations and also with a few raised lumps lying under the the visceral pleuræ, which on examination are found to be irregular shaped calcareous bodies, yellow in colour. The right apex is the seat of emphysema; the rest of the lung being well filled with air. *On section* and pressure some yellow blood-stained frothy fluid exudes from the cut surfaces. The left apex is also the seat of localized emphysema, the base and above it for some ten inches is solid, and the pleura covering it, is opaque and thickened, yellowish in colour, but there are no adhesions. *On section*, the lobules are well defined, the intervals between the lobules being occupied with yellow-coloured exudation; while the lung tissue presents a variegated appearance, some groups of lobules being the colour of raw beef, whilst others are of an orange colour.

Heart.—Weighs 4 lbs. 14 ozs. There is a little orange-coloured fluid in the cavity of the pericardium. The base of the organ is the seat of much yellow-coloured exudation occupying the position of fat which is usually observed; the appearance reminds one of dark brown-coloured solidified gelatine covered by the transparent glistening layer of the visceral pericardium. This gelatinous exudation accompanies the coronary vessels from the base to the apex and presents a broad strip ¾th inch in width and ¼th to ½ inch in depth, dotted over here and there with petechiæ.

The Right auricle.—Is distended with blood and numerous extravasations are dotted over the surface of the muscular tissue, both anteriorly and posteriorly, lying under the visceral pericardium.

The Right ventricle.—Presents two large extravasations, one lying beneath the right auricle just below the auriculo-ventricular groove, and a second one 1·5 × 1 inch, lying to the right of the inter-ventricular groove.

The Left auricle.—Presents a few small extravasations dotted over its surfaces.

The Left ventricle.—Presents numerous and extensive extravasations, especially at its upper part, and extending towards the apex for nearly an inch in extent. These are present anteriorly and posteriorly. *On section*, the *Right auricle* presents a few extravasations lying under the endocardial lining. The *Right ventricle* also presents a few sub-endocardial extravasations. The valves are healthy and are not petechiated. The *Left auricle* presents a few sub-endocardial extravasations. The *Left ventricle* presents very extensive extravasations especially those involving the musculi papillares, colouring them almost black. The valves are healthy.

Stomach.—Small. *On section*, it contains some semi-digested food. The *cuticular* portion of lining membrane is healthy. The *villous* coat is pale and healthy, with the exception of a small tumour (*Spiroptera Megastoma*), the size of a small walnut, which lies beneath the mucous membrane and so raises the villous coat above the ordinary level of the tissues. *On section*, this is found to be a clot of blood lying in a small cavity.

Liver.—Weighs 11 lbs. 2 ozs. There are signs of old perihepatitis on the convex surface of the organ, also numerous round patches on the surface of the capsule of an opalescent hue, and a few yellow calcareous bodies are seen lying beneath the capsule. *On section*, the tissue presents a brownish colour, the individual lobules stand out very distinctly and a few yellow calcareous bodies are found to pervade the tissues.

Spleen.—Weighs 3 lbs. 5 ozs. The capsule is dotted over with small irregular shaped extravasations. *On section*, the tissue is firm and healthy.

Kidneys.—Right 1 lb. 5 ozs. Left 1 lb. 6½ ozs. The capsules strip easily, revealing very pale tissue beneath, with the stellate veins injected. *On section*, the cortical and medullary portions are pale but there are no extravasations.

Brain.—The superficial veins are congested, and the convolutions somewhat flattened. The lateral ventricles contain 2½ to 3 ounces of clear fluid and the Iter a tertio, &c., will allow of a penholder ⅕th of an inch in diameter, to be passed into it.

The points of interest in this case are:—

(i). That this horse was successfully inoculated with fluid containing hæmatozoa from the tunica vaginalis testis of a Goat.

(ii). The period of incubation in this case, from the inoculation to the appearance of hæmatozoon in the blood, was 5 days.

(iii). The well marked Urticarial eruption which appeared two days after the appearance of the hæmatozoon in the general circulation and persisted for twelve hours and then commenced to fade.

(iv). The period elapsing between the inoculation and the death of the animal was twenty-two days.

(v). The extensive pathological lesions presented by the heart both externally and *on section*.

CASE No. XXXIV.—GREY C. B. GELDING, *aged, in fair condition and appears healthy.*

1891.

24th July.—Temp. A.M. ———	Blood healthy.	Temp. P.M. 36·8°C.
25th „ .—Temp. A.M. 35·8°C.	Blood healthy.	Temp. P.M. 36·3°C.
26th „ .—Temp. A.M. 36°C.	Blood healthy.	Temp. P.M. 36·4°C.
27th „ .—Temp. A.M. 35·7°C.	Blood healthy.	Temp. P.M. 36·4°C.
28th „ .—Temp. A.M. 36°C.	Blood healthy.	Temp. P.M. 36·5°C.
29th „ .—Temp. A.M. 35·5°C.	Blood healthy.	Temp. P.M. 36·3°C.
30th „ .—Temp. A.M. 35·5°C.	Blood healthy.	Temp. P.M. 36·5°C.
31st „ .—Temp. A.M. 36·1°C.	Blood healthy.	Temp. P.M. 36·4°C.
1st August.—Temp. A.M. 35·3°C.	Blood healthy.	Temp. P.M. 36·4°C.

2nd „ 1-45 *P.M.*—Inoculated the animal subcutaneously over the left shoulder with 1 c.c. of blood from the Internal Jugular Vein of Horse No. XXXI, mixed with ·6 per cent salt solution. Temp. A.M. 36·3°C. Blood healthy. Temp. P.M. 37·2°C.

3rd.—Condition of animal good, appetite good, evacuations normal. There is slight swelling at the seat of inoculation. Temp. A.M. 36·4°C. No hæmatozoa in the blood. Temp. P.M. 37°C.

4th.—The condition of animal is unchanged. Increased swelling and œdema at the seat of inoculation. Temp. A.M. 37·8°C. No hæmatozoa in the blood. Temp. P.M. 36·8°C.

5th.—The animal appears fairly well; appetite good, pulse firm; swelling and œdema have increased in amount. Temp. A.M. 36·4°C. No hæmatozoa in the blood. Temp. P.M. 36·7°C.

6th.—The health of the animal continues good. Swelling and œdema have increased and the tumor is tense and tender. Temp. A.M. 35·8°C. No hæmatozoa in the blood Temp. P.M. 36·8°C.

7th.—The condition is unchanged. Swelling and œdema the same. Temp. A.M. 35·6°C. No hæmatozoa in the blood. Temp. P.M. 36·3°C.

8th.—The condition is unchanged. Swelling and œdema the same. Temp. A.M. 35·6°C. No hæmatozoa in the blood. Temp. P.M. 36·3°C.

9th.—The condition is unchanged. Swelling and œdema the same. Temp. A.M. 35·8°C. No hæmatozoa in the blood. Temp. P.M. 36·2°C.

10th.—The condition is unchanged. Swelling and œdema the same. Temp. A.M. 35·8°C. No hæmatozoa in the blood. Temp. P.M. 36·2°C.

11th.—The condition is unchanged. Swelling and œdema the same. Temp. A.M. 35·5°C. No hæmatozoa in the blood. Temp. P.M. 36·3°C.

12th.—The condition is unchanged. Swelling and œdema the same. Temp. A.M. 35·1°C. No hæmatozoa in the blood. Temp. P.M. 36·5°C.

13th.—The animal appears weaker, but the appetite continues good. Temp. A.M. 35·5°C. No hæmatozoa in the blood. Temp. P.M. 36·2°C.

14th.—Temp. A.M. 35·5°C. There are numerous hæmatozoa in the blood. Temp. P.M. 36°C.

15th.—Temp. A.M. 37·2°C. There are very numerous hæmatozoa in the blood. Temp. 10·15 A.M. 38·7°C. The animal fell at 6 A.M. and death took place suddenly at 10-45 A.M.

AUTOPSY at 12 o'clock noon.—The animal is fairly well nourished. The petechiæ are well marked on the conjunctival membranes.

Thorax.—There is no fluid in the pleural cavities.

The Lungs are large and are fully distended with air; the apices are the seat of emphysema. There are some patches on the visceral pleura at the base of the left lung, which are thickened, but there are no adhesions. The lungs present three or four small extravasations dotted over their surfaces, about $\frac{1}{6}$th of an inch in diameter, and two small concretions, one on the superior surface of the anterior lobe of the left lung and the other near the base of the organ on the same side. *On section* of the organs, blood flows freely from the cut surfaces of the tissues. The tissues appear healthy.

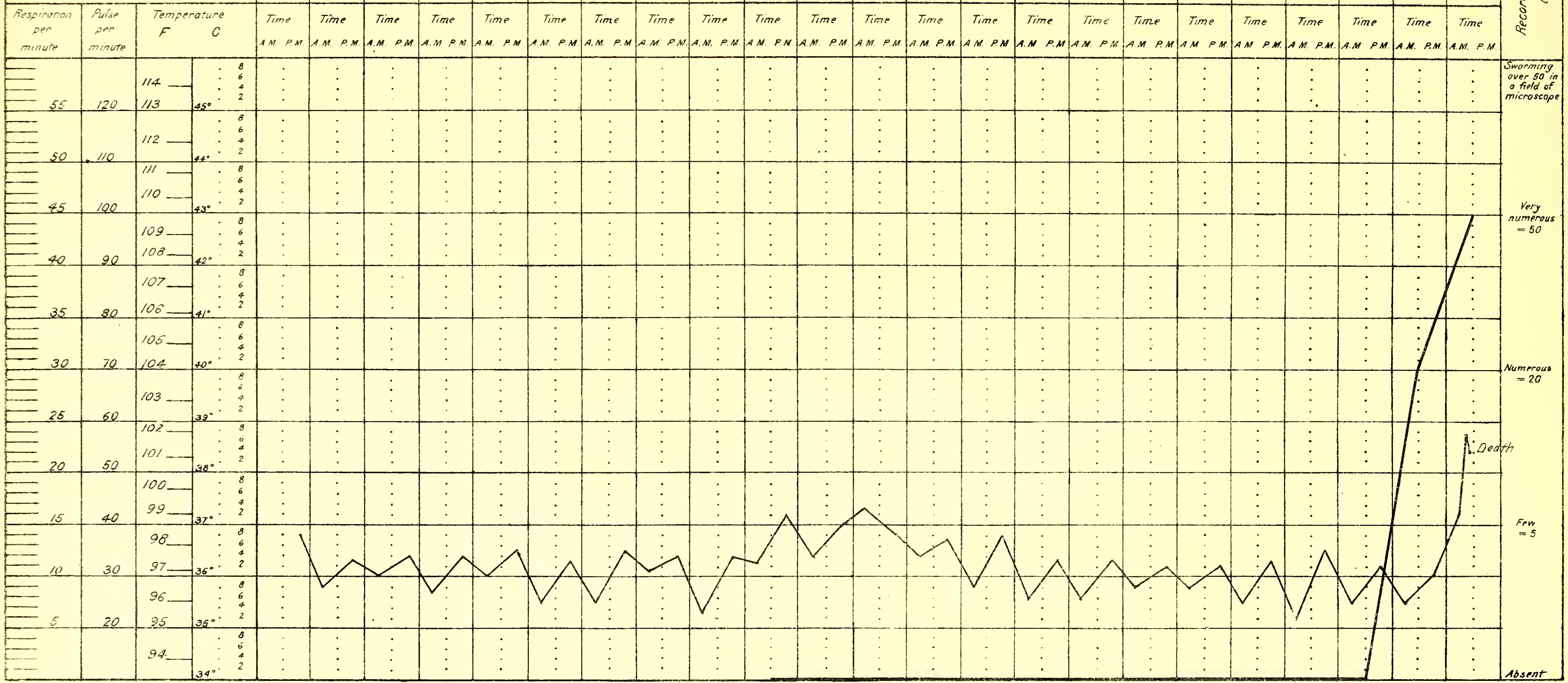
Heart weighs 7 lbs. 10 ozs. The base is the seat of much yellow jelly, lying under the visceral pericardium and there are several patches of extravasation, made up of a number of small ones. One patch is situated in the course of Left Coronary Artery, and

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Gelding. Country-bred. Age, Aged Sex, Gelding Colour, Grey

Disease. 'Surra' Inoculated Date of Inoculation, 2nd Aug. 1891. Result, Death Date of Result, 15. 8. 1891 Register No. XXXIV

Dates of Observation.	July 24	25	26	27	28	29	30	31	Aug. 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Days of Disease																						1	2
Organisms in Blood.										—	—	—	—	—	—	—	—	—	—	—	—	N	VN



(S 4/6)

Hæmatozoon curve
Temperature.......

Drawn & Litho. Govt. Photozinco: Office Poona 1892.

X Inoculated Subcutaneously with 1. cc of blood taken from the Int. Jugular Vein of Horse No. XXXI.

the other is in the course of the Right. The muscular structure of the heart looks pale and on section presents the same colour. The *right auricle* is healthy. The *right ventricle* is pale and the seat of a number of small sub-endocardial extravasations, and the walls are somewhat hypertrophied. The *left auricle* presents a few small extravasations. The walls of the *left ventricle* are very much hypertrophied. There are very extensive extravasations lying under the endocardium, the intervening tissue being pale in colour.

Liver small and weighs 9 lbs. 14 ozs. Convex surface presents numerous old patches of perihepatitis. There are numerous round yellow bodies on the surface of the organ which on examination are found to have undergone a calcareous change. *On section,* the tissues are dark in colour and the same kind of calcareous bodies are dotted about throughout the organ.

Stomach contains a small amount of semi-digested food. *On section,* the line of demarcation between the villous and cuticular portions presents a bright-yellow colour, but there are no patches of congestion or tumours involving the villous portion, as so commonly occurs.

Spleen weighs 2 lbs. 9 ozs. The convex surface is dotted over with small dark-brown minute extravasations. *On section,* the tissue is firm and looks healthy.

Kidneys.—Right 1 lb. 4 ozs., left 1 lb. 5 ozs. The capsules strip easily, and reveal no abnormalities. *On section,* the organs appear pale but healthy.

Brain.—The superficial veins are congested, and the substance of the brain is pale in colour. *On section,* the lateral ventricles contain 5 ounces of a pale-coloured fluid, but on microscopical examination the Surra hæmatozoon was not discovered in it. The Iter-a-tertio, &c., appears increased in size and the cavity of the spinal membranes contains some fluid.

Ths points of interest in this case are :—

(i). That the animal was subcutaneously inoculated with 1 c.c. of blood (containing numerous hæmatozoa)—mixed with ·6 per cent salt solution—drawn from the Internal Jugular Vein of Horse No. XXXI. The virus had been passed through a previous horse from the goat.

(ii). The period of incubation from the inoculation until the first appearance of the hæmatozoon in the blood was thirteen days.

(iii). The short duration of life, only twenty-seven hours after the appearance of the hæmatozoon in the general circulation.

(iv). The extensive pathological lesions involving the heart and other organs, together with the presence of a considerable amount of fluid in the lateral ventricles of the brain.

CASE No. XXXVIII.—CREAM-COLOURED C. B. ENTIRE HORSE.

23rd August, 1891.—*On admission*, the animal is in very good condition. The coat smooth, the visible mucous membranes healthy, and no sign of petechiæ on the conjunctivæ. The pulse is strong and regular; the appetite good and the evacuations natural in character. Temp. P.M. 37·4°C. P. 33. R. 15. The blood is healthy.

24th.—Temp. A.M. 37·1°C., P.M. 37·1°C. Blood healthy.
25th.— „ „ 36·4°C. „ 37·1°C. „ „
26th.— „ „ 36·7°C. „ 37·2°C. „ „

Inoculated subcutaneously on the left cheek between the eye and the nostril with 1 C.C. of blood taken from the heart of Horse No. XL, nine and a half hours after death. The injected blood contained very numerous Surra hæmatozoa at the time of death of the animal.

27th.—The animal appears bright, and is in good condition. Temp. A.M. 36·8°C. There are no hæmatozoa in the blood. Temp. P.M. 37·3°C.

28th.—The condition of the animal is unchanged. Temp. A.M. 37°C. No hæmatozoa in the blood. Temp. noon 37·8°C., 5 P.M. 37·5°C.

29th.—The condition of the animal is unaltered; there is however a small swelling, the size of a rupee, at the seat of inoculation, but no petechiæ on the conjunctival membranes. Temp. A.M. 36·7°C. No hæmatozoa in the blood. Temp. P.M. 37·3°C.

30th.—The swelling at the seat of inoculation has increased since yesterday. Temp. A.M. 36·7°C. There are no hæmatozoa in the blood. Temp. P.M. 37·3°C.

31st.—The condition of the animal is unchanged. Temp. A.M. 37·4°C. No hæmatozoa in the blood. Tem. P.M. 37·1°C.

1st September.—The animal looks bright, the appetite is good, and the excretions are healthy. Temp. A.M. 38·1°C. No hæmatozoa in the blood. Temp. P.M. 39·4°C.

2nd.—The swelling at the seat of inoculation has increased in size and is somewhat tense and tender to the touch, but there are no petechiæ on the conjunctival membranes. Temp. A.M. 37·5°C. No hæmatozoa in the blood. Temp. P.M. 38·2°C.

3rd.—There is more swelling and œdema at the seat of inoculation. The tumor continues to present both tension and tenderness on manipulation. Temp. A.M. 40°C. No hæmatozoa in the blood. Temp. P.M. 38·3°C.

4th.—The tumor at the seat of inoculation has not decreased in size; but the tension on the structure is certainly diminished and on manipulation the animal does not draw itself away in the same way as it did yesterday. Temp. A.M. 40·6°C. The hæmatozoa are very numerous in the blood. Temp. P.M. 38·5°C.

5th.—The swelling at the seat of inoculation is considerably reduced in size; there are a few ecchymoses on the conjunctival membranes; the appetite remains very good and the excretions normal. Temp. A.M. 41·2°C. Hæmatozoa are numerous in the blood. Temp. P.M. 38·7°C.

6th.—The condition of the animal is unchanged, with this exception that the ecchymoses are now very large, and dark in colour on the conjunctival membranes, especially on the membranæ nictitantes. Temp. A.M. 38°C. Hæmatozoa are few in the blood. Temp. P.M. 38·5°C.

7th.—The condition of the animal is unchanged. Temp. A.M. 37·8°C. Hæmatozoa few in the blood. Temp. P.M. 38·6°C.

8th.—The swelling at the seat of inoculation is very much smaller, and the tenderness has quite disappeared. The ecchymoses are still extensive on the right membrana nictitans. Temp. A.M. 41·4°C. The hæmatozoa are very numerous in the blood. Temp. P.M. 39°C.

9th.—The animal is losing flesh, especially about the Glutei muscles, but the appetite is good, and the excretions are normal in character. Temp. A.M. 38·6°C. Hæmatozoa absent from the blood. Temp. P.M. 38·7°C.

10th.—The animal has remained standing for the past seventy-two hours, but the extremities are not swollen or œdematous. The conjunctival membranes are clearer than they have been for some days. Temp. A.M. 37·1°C. Hæmatozoa absent from the blood. Temp. P.M. 38·5°C,

11th.—Condition unchanged. Temp. A.M. 37·5°C. Hæmatozoa absent. Temp. P.M. 38·4°C.

12th.—There are several fresh ecchymoses visible on the conjunctival membranes, but the general condition of the animal is unaltered. Temp. A.M. 37·4°C. The hæmatozoa are few in the blood. Temp. P.M. 38·5°C.

13th.—The condition of the animal is unchanged. Temp. A.M. 41·6°C. Hæmatozoa swarming in the blood. Temp. P.M. 39·6°C.

14th.—The animal is brighter, but the emaciation is progressive; the appetite continues good. The amount of urine passed during the twenty-four hours is somewhat below normal, very concentrated, viscid, and highly alkaline. Temp. A.M. 38·1°C. Hæmatozoa abent. Temp. P.M. 37·7°C.

15th.—Condition unchanged. Temp. A.M. 37·4°C. Hæmatozoa absent. Temp. P.M. 37·8°C.

16th.—Condition of the animal is very unsatisfactory; it is dull; appetite poor; the urine is scanty, creamy grey in colour (*vide* urine chart). Temp. A.M. 37·8°C. The hæmatozoa are absent from the blood. Temp. P.M. 38·1°C.

17th.—The condition of the animal is unchanged. Temp. A.M. 38·°C. Hæmatozoa few. Temp. 1 P.M. 40·5°C. Temp. 5 P.M. 38·2°C.

18th.—Condition unchanged, except that there is a little more urine passed. Temp. A.M. 41·3°C. Hæmatozoa are very numerous in the blood. Temp. 1 P.M. 42°C. Temp. 5 P.M. 41·4°C.

19th.—The animal has certainly improved since yesterday; the appetite has improved and the urine has increased in quantity. Temp. A.M. 38·4°C. Hæmatozoa absent from the blood. Temp. P.M. 38·8°C.

20th.—The animal continues to improve. Temp. A.M. 37·7°C. Hæmatozoa are absent from the blood. Temp. P.M. 38·7°C.

21st.—Continues to improve. Temp. A.M. 37·6°C. Hæmatozoa absent. Temp. P.M. 38·4°C.

22nd.—Improvement continues; the ecchymoses have all cleared from the conjunctival membranes, which are now pale; the appetite is very good. Temp. A.M. 38·8°C. Hæmatozoa few in the blood. Temp. 1 P.M. 41·8°C. Hæmatozoa very numerous in the blood, consequently the animal has become dull and the appetite has fallen off. Temp. 5 P.M. 39·8°C. Hæmatozoa fallen to few at 6-30 P.M.

23rd.—Condition unchanged since last night. Temp. A.M 39·5°C. Hæmatozoa few. Temp. P.M. 38·8°C.

24th.—Slight improvement since yesterday. The appetite is good and the fæces are healthy. Temp. A.M. 38°C. Hæmatozoa few in the blood. Temp. 1 P.M. 40·8°C., 5 P.M. 39·4°C.

25th.—The condition of the animal has distinctly improved, and it appears brighter; the appetite continues to be good. Temp. A.M. 39·1°C. Hæmatozoa are few in the blood. Temp. P.M. 38·4°C.

26th.—This morning the visible mucous membranes are yellow in colour as also the sclerotics. Temp. A.M. 37·5°C. Hæmatozoa are few in the blood. Temp. P.M. 38·3°C.

27th.—Condition unchanged. Temp. A.M. 39·1°C. Hæmatozoa are very numerous in the blood. Temp. 1 P.M. 41°C. and at 5 P.M. 39·3°C.

28th.—Condition unchanged. Temp. A.M. 40·9°C. Hæmatozoa very numerous in the blood. Temp. 1 P.M. 40·6°C. and at 5 P.M. 39·2°C.

29th.—Condition unchanged. Temp. A.M. 37·8°C. Hæmatozoa absent from the blood. Temp. P.M. 38·2°C.

30th.—The visible mucous membranes still retain the yellow colour; there is some œdema of the extremities. Temp. A.M. 37·5°C. Hæmatozoa very numerous in the blood. Temp. P.M. 38·4°C.

1st October.—The extremities are more swollen and œdematous, but they are not painful on manipulation; the appetite is good and the evacuations fairly healthy. Temp. A.M. 38·1°C. Hæmatozoa are very numerous in the blood. Temp. 1 P.M. 39·7°C., 5 P.M. 37·8°C.

2nd.—The animal is dull and off its feed; the Temp. high, 40·5°C., and the hæmatozoa swarming in the blood. Temp. P.M. 40·3°C.

3rd.—The swelling and œdema of the extremities have increased in extent and now the sheath is somewhat swollen. Temp. A.M. 39·4°C. Hæmatozoa are swarming in the blood. Temp. 1 P.M. 40·4°C. and 5 P.M. 39·8°C.

4th.—The swelling and œdema continue to increase. Temp. A.M. 40°C. Hæmatozoa are very numerous in the blood. Temp. 1 P.M. 41°C. and at 5 P.M. 39·7°C.

5th.—The animal appears a little brighter and the appetite is good. There are a few fresh petechiæ on the conjunctival membranes. Temp. A.M. 38·3°C. The hæmatozoa are absent from the blood. Temp. P.M. 38·3°C.

6th.—Condition continues to improve. Temp. A.M. 38°C. Hæmatozoa absent. Temp. P.M. 38·4°C.

7th.—Condition unchanged. Temp. A.M. 38·3°C. Hæmatozoa absent. Temp. P.M. 38·6°C.

8th.—Condition unchanged. Temp. A.M. 38·4°C. Hæmatozoa few. Temp. 1 P.M. 39·4°C. and at 5 P.M. 39°C.

9th.—The animal is again dull and the appetite poor. Temp. A.M. 40·3°C. Hæmatozoa very numerous. Temp. 1 P.M. 41·1°C. and at 5 P.M. 40·4°C.

10th.—For some days past the animal has been urinating three to four times a day; at present these have increased to seven or eight times in the twenty-four hours. Temp. A.M. 39·6°C. Hæmatozoa swarming. Temp. 1 P.M. 40·6°C. and at 5 P.M. 40°C.

11th.—The swelling and œdema are now increasing in extent, and spreading over the under-surface of the abdomen. Temp. A.M. 38·4°C. Hæmatozoa are swarming in the blood. Temp. 1 P.M. 40·6°C., at 5 P.M. 40·5°C.

12th.—The animal is getting weaker; the œdema is spreading forward along the under-surface of the abdomen and between the fore-limbs. The urine continues to be passed in increased quantity. Temp. A.M. 38·3°C. Hæmatozoa are swarming in the blood. Temp. 1 P.M. 39·4°C., at 5 P.M. 39·1°C.

13th.—Condition unchanged. Temp. A.M. 38·5°C. Hæmatozoa swarming. Temp. 1 P.M. 40·4°C., at 5 P.M. 39·7°C.

14th.—The animal is much weaker and the œdema has now reached the front of the chest. Temp. A.M. 38·4°C. Hæmatozoa continue to swarm in the blood. Temp. 1 P.M. 40°C., at 5 P.M. 39·6°C.

15th.—The right testicle is swollen, and tender on manipulation. Appetite capricious. Temp. A.M. 38·1°C., 1 P.M. 39·6°C. and at 5 P.M. 39·2°C. Hæmatozoa continue to swarm in the blood.

16th.—There are very extensive ecchymoses of blood principally involving the membrana nictitans of the right eye. Appetite good. Urination takes place eight times in the twenty-four hours. Temp. A.M. 38·1°C. Hæmatozoa swarming in the blood. Temp. 1 P.M. 40°C. At 4·45 P.M. the animal fell, and being unable to regain the upright position, remained lying on its right side. No struggling. Temp. 39·6°C. Pulse 90 at 5 P.M. The eyes became fixed and glassy and the legs flexed. At 5-6 P.M. the fore-limbs were suddenly shot out straight and became quite rigid; this was followed by spasm with rigidity of the muscles of the head and neck. The pupils are somewhat contracted. 5-15 P.M., respirations 40 per minute, and passed fæcal matter; this act appeared to initiate and keep up rigidity of the hind limbs, which condition continued until death took place. Pulse 120. Temp. 40·1°C.; at 5-43 P.M., temp. 40·1°C. Pulse 128. Resp. 43. At two feet distance from the chest one can distinctly hear the tumultuous action of the heart, but not detect any murmur. At 5-53, Cheyne-Stokes respiration very well marked, which continued until death took place at 6 P.M.

AUTOPSY at 6-15 P.M. The body is somewhat emaciated; there is swelling and œdema of the extremities, under-surface of the abdomen, extending between the fore-limbs. The visible mucous membranes are anæmic.

Thorax.—The pleural cavities contain no fluid and there are no pleuritic adhesions.

Lungs appear small; the anterior lobes are the seat of localized emphysema, with two portions, one near the apex of each organ, about the size of a walnut, blown up like a bladder. There are no ecchymoses, or extravasations of blood to be seen on the pleural surfaces, but on manipulation of the organs, several very hard calcareous bodies can be felt ¾th to ½″ in length, lying in the midst of the tissues. *On section,* the tissues present a yellowish-red colour, but appear normal in structure.

On opening the cavity of the *pericardium,* it is found to contain three ounces of an amber-coloured fluid, and several extensive extravasations of blood on the external surface of the heart are brought into view. One runs down from the base of the organ towards the apex, accompanying the left coronary vessels, extending for ¼th inch on either side of them. The muscular surface of both auricles is dotted over with numerous circular-shaped ecchymoses about ⅛th inch in diameter and of a dark-purple colour, and these latter as well as the extensive extravasations are found to be situated beneath the visceral layer of the pericardium. *On section,* the *right auricle* contains a few dark clots, but no sub-endocardial extravasations. The *right ventricle* is full of black clot, but there are no extravasations. The valves are healthy. There are a few clots in the *left auricle,* but no extravasations; this is also the case in the *left ventricle.* The valves are healthy.

Liver weighs 9 lbs. 15 ozs., is dark-brown in colour, but presents several circular white patches an inch in diameter upon the surface of Glisson's capsule. At these spots the capsule is considerably thickened, more so at the centre than at the circumference. *On section,* the tissues present the same dark-brown appearance but are healthy.

Spleen weighs 2 lbs. 9 ozs., and is dark in colour; the surface of the capsule presents numerous small dark-coloured, circular, raised lumps. Many of these average from ⅛th to

$\frac{1}{4}$th inch in diameter and are raised from $\frac{1}{12}$th to $\frac{1}{8}$th of an inch above the surrounding tissue of the organ. *On section,* the tissues are firm and look healthy.

Kidneys.—The right weighs 1 lb. 2½ ozs., the left 1 lb. 3 ozs. The capsules strip easily and reveal extremely pale tissues beneath, but there are no extravasations of blood upon the cortical portion of the organs. *On section*, the tissues are pale in appearance, but otherwise normal to the naked eye.

Stomach.—External surface normal. *On section,* it contains some semi-digested food. The *cuticular* and *villous* portions are healthy.

Small Intestines present a few small ecchymosed patches lying dotted here and there on the surface of the mucous membrane, but there is no ulceration, and contain no parasites.

Large Intestine.—Healthy in appearance.

Bladder contains a considerable quantity of fluid, but on section there are no extravasations into or lying beneath the mucous membrane.

Remarks.—This animal was in very good condition, and was kept under observation from the 23rd to the 26th of August, during which time it was apparently healthy. On the 26th it was inoculated with 1c.c. of blood from Horse No. XL, the blood being taken from the heart nine and a half hours after death. From this date until the 4th, with the exception of very slight suppuration at the seat of inoculation and a rise of temperature on the morning of the 3rd September, no signs of disease were noted, but on the morning of the 4th the blood contained very numerous hæmatozoa. On the 7th there were no organisms and the temperature had fallen, but on the 8th they were again very numerous and the morning temperature had risen to 41·4°C. On the 9th the temperature had fallen but there were no hæmatozoa in the blood. From the date of the first appearance of the hæmatozoa, ecchymoses appeared on the conjunctivæ and the animal had been gradually, losing flesh. From the 9th to the 12th there were no hæmatozoa in the blood, but on the 12th there were a few, and on the 13th became swarming. During the period in which the organisms were absent from the blood the temperature fell to normal, and as the organisms increased in the blood the temperature rose. From the 14th to the 17th the organisms were again absent and the temperature normal, but on the 17th the organisms were few and on the 18th very numerous, and on this latter date the temperature rose to 42°C. On the morning of the 19th they were again absent and the temperature had fallen to normal, but during the early morning of the 22nd a few organisms were detected in the blood, and during the day the temperature having risen very considerably, another examination of the blood was made and the organisms found to be very numerous. On the 23rd the organisms were few, and remained so until the 28th. On the 29th the organisms were absent from the blood and the temperature fell to normal; on the 1st October the organisms were very numerous, but the temperature did not rise very high, and fell to normal at night. On the 2nd the organisms were swarming and the temperature rose considerably. On the 3rd, swarming and temperature still high; on the 4th very numerous, the mid-day temperature being higher than that on the previous two days. On the 5th, 6th and 7th the organisms were absent, and the temperature normal. On the 8th, organisms few, temperature slightly raised; on the 9th, very numerous, temperature high (41·2°C.), and on the 10th the organisms were swarming and remained in this condition until the evening of the 16th, but the temperature oscillated between 40·6°C. and 38°C. and rose to 40·2°C. at the time of death.

During the progress of this case the usual symptoms of Surra appeared and were progressive until death, the animal becoming gradually weaker, the limbs, sheath and abdomen swollen and œdematous; ecchymoses appearing on the conjunctivæ, and the membranes being tinged yellow. The appetite, however, remained fairly good throughout. On 25th September symptoms of kidney disease were noticed and casts were found in the urine; these continued in greater or less numbers up to the time of death.

Up to the 9th of October the urine remained alkaline, on the following day it was neutral, on the 11th slightly acid, on the 12th acid, and from the 13th until death strongly acid.

The chief points of interest in this case are :—

(i). The blood was not inoculated until it was nine and a half hours old, thus proving that it remains virulent for this length of time when contained in the vessels of the animals.

(ii). The peculiar relapses which occurred during the course of the disease, and the absence of any regularity in the relapses.

(iii). That symtoms of kidney disease developed during the course of the malady.

(iv). The fact that the urine remained alkaline until the seventh day previous to death, when it became respectively neutral, acid, and lastly strongly acid.

(v). The extensive pathological changes observed in the heart at the *Post-mortem,* and the complete absence of lesions in the stomach, and parasites from the intestinal canal.

RECORDS OF URINE.

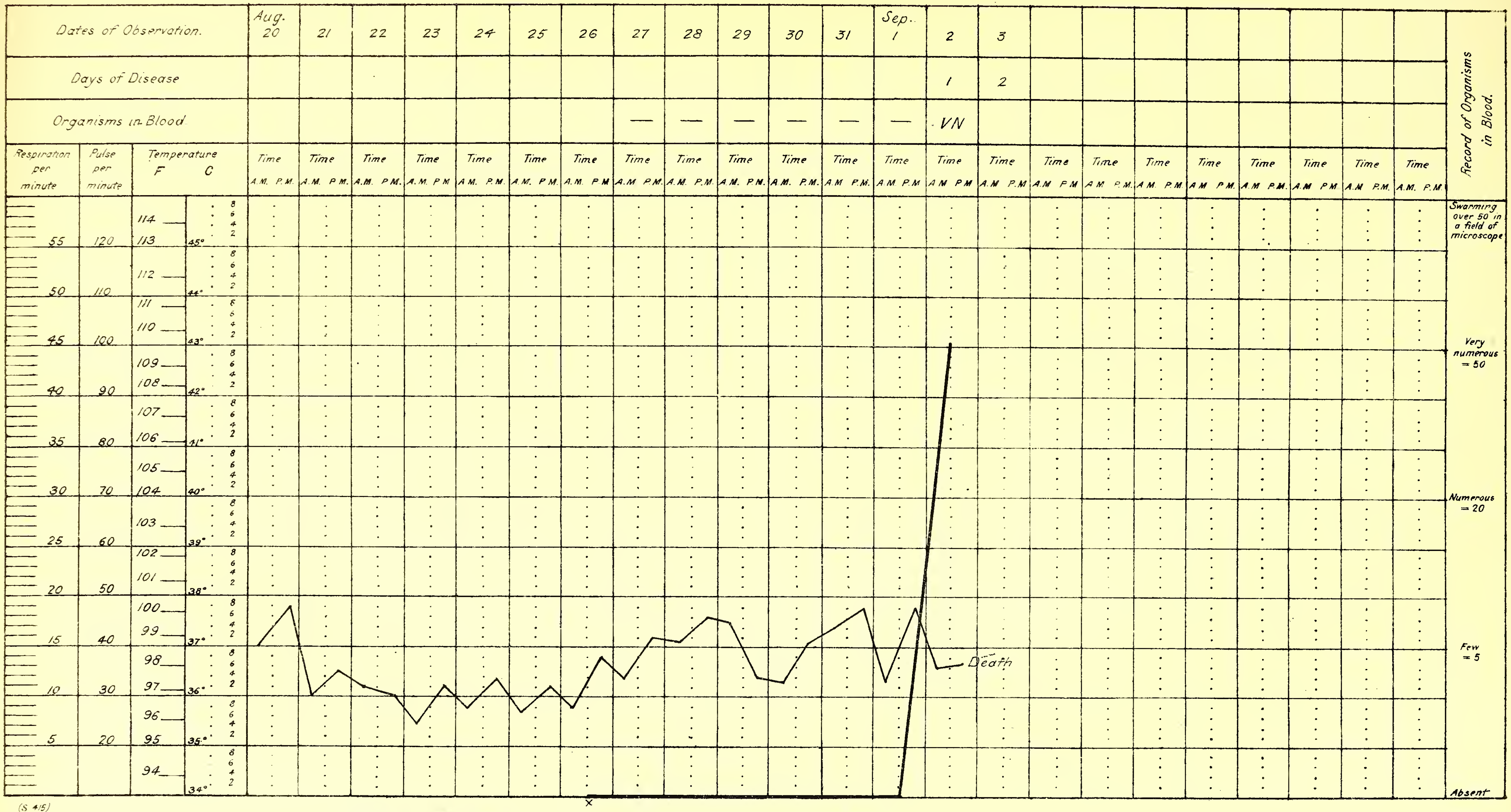
Animal, Cream-coloured Horse No. XXXVIII, Date, { *Inoc. 26th August 1891.*
Death, 16th October 1891.
Disease, Surra Inoc.

Date.	Quantity.	Colour.	Re-action.	Specific Gravity.	Albumen.	Phosphates.	REMARKS.
1891.							
September 2	...	Turbid, viscid, reddish-yellow.	Alkaline	1,044	...	Nil	Epithelial and blood casts.
3	...	Turbid, viscid, greenish-yellow.	Do.	1,042	A trace.	Nil	Do. do.
4	...	Do.	Do.	1,043	,,	Nil	Do. do.
5	...	Turbid, viscid, peasoup.	Do.	1,030	,,	Nil	Do. do.
6	...	Do.	Do.	1,033	,,	Nil	Do. do.
7	...	Do.	Do.	1,032	,,	Nil	Do. do.
8	...	Do.	Do.	1,030	,,	Nil	Do. do.
9	...	Do.	Do.	1,013	,,	Nil	Do. do.
10	...	Do.	Do.	1,032	,,	Nil	Do. do.
11	...	Do.	Do.	1,028	,,	Nil	Do. do.
12	...	Do.	Do.	1,030	,,	Nil	Do. do.
13	...	Turbid, viscid, greenish-yellow.	Do.	1,024	,,	Nil	Do. do.
14	...	Do.	Do.	1,022	,,	Nil	Do. do.
15	Scanty	Do.	Do.	1,030	,,	Nil	A few blood and numerous granular casts, carbonates no oxalates.
16	Do.	Do.	Do.	1,037	,,	Nil	Do. do.
17	Do.	Do.	Do.	1,043	,,	Nil	Do. do.
18	Increased in amount.	Turbid, viscid, orange.	Strongly Alkaline.	1,030	,,	Nil	Granular casts, carbonates in large amount.
19	Normal quantity.	Do.	Do.	1,023	,,	Nil	Do. do.
20	...	Do.	Do.	1,025	,,	Nil	Do. do.
21	...	Do.	Do.	1,023	,,	Nil	Do. do.
22	...	Do.	Do.	1,041	,,	Nil	Do. do.
23	...	Turbid, viscid, like linseed tea.	Do.	1,033	,,	Nil	Do. do.
24	...	Turbid, viscid, orange.	Do.	1,038	,,	Nil	Do. do.
25	...	Viscid, dark-brown.	Do.	1,040	,,	Nil	Granular casts, no blood corpuscles, striated spheres of $CaCo_3$ oxalates of lime.
26	...	Viscid, muddy-amber.	Do.	1,012	,,	Nil	Casts, heavy precipitate of carbonates, oxalates.
27	...	Viscid, muddy reddish-yellow.	Do.	1,041	,,	Nil	Do. do.
28	...	Viscid, brown, odour of tea.	Do.	1,030	Nil	Nil	Do. do.
29	...	Viscid, orange, opaque.	Do.	1,033	Nil	Nil	Do. do.
30	...	Do.	Do.	1,036	Nil	Nil	Do. do.
October 1	...	Do.	Do.	1,040	Nil	Nil	Do. do.
2	...	Do.	Do.	1,030	Nil	Nil	Striated spheres, large and small, custard apple form dumb-bell forms large and small of carbonate of lime.
3	...	Do.	Do.	1,026	Nil	Nil	Oxalate of lime and straight colourless needles
4	...	Do.	Do.	1,024	Nil	Nil	Do. do.
5	...	Do.	Do.	1,026	Nil	Nil	Do. do.
6	...	Do.	Do.	1,034	Nil	Nil	Do. do.
7	...	Do.	Do.	1,038	Nil	Nil	Do. do.
8	...	Do.	Do.	1,036	Nil	Nil	Do. do.
9	...	Do.	Do.	1,032	Nil	Nil	Precipitate of carbonates on boiling.
10	...	Not so viscid orange.	Neutral	1,026	Nil	Nil	Slight amount of carbonates.
11	...	Clear, bright-orange.	Slightly acid.	1,032	Nil	Nil	Do. do.
12	...	Do.	Acid	1,028	Nil	Nil	Slight trace of carbonates.
13	...	Do.	Strongly acid.	1,024	Nil	Nil	Complete absence of carbonates, needles and feathery crystals.
14	...	Do.	Do.	1,020	Nil	Nil	Do. do.
15	...	Orange, clear	Do.	1,020	Nil	Nil	Complete absence of carbonates.
16	...	Clear-yellow	Do.	1,010	Nil	Nil	Do. do.

RECORDS OF TEMPERATURE PULSE AND RESPIRATION

Brown Country-bred Mare ______ Age, Aged ______ Sex, Mare ______ Colour, Brown ______

Disease, Inoculated 'Surra' ______ Date of Inoculation, 26. 8. 1891 ______ Result, Death ______ Date of Result, 3. 9. 91. ______ Register No. XLI ______



(S 415)

Hæmatozoon curve
Temperature ……

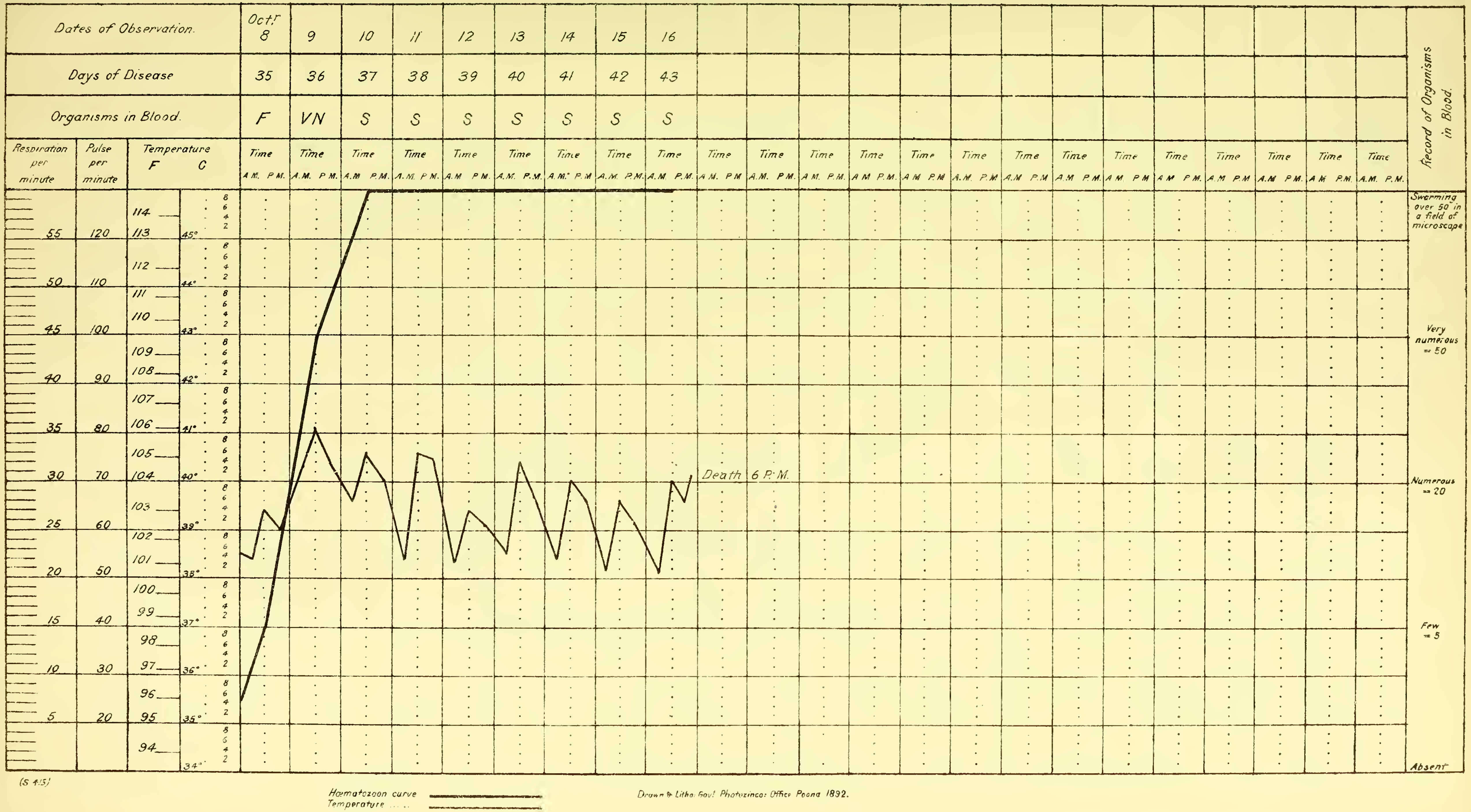
Drawn & Litho: Govt. Photozinco: Office Poona 1892.

Inoc.× Subcutaneously with 1·0 cc of blood taken from the heart of Horse No. XL. 9½ hours P.M.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age ______ Sex ______ Colour ______

Disease ______ Date of Attack ______ Result ______ Date of Result ______ Register No. XXXVIII.



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Drawn & Litho: Govt. Photozinco: Office Poona 1892.

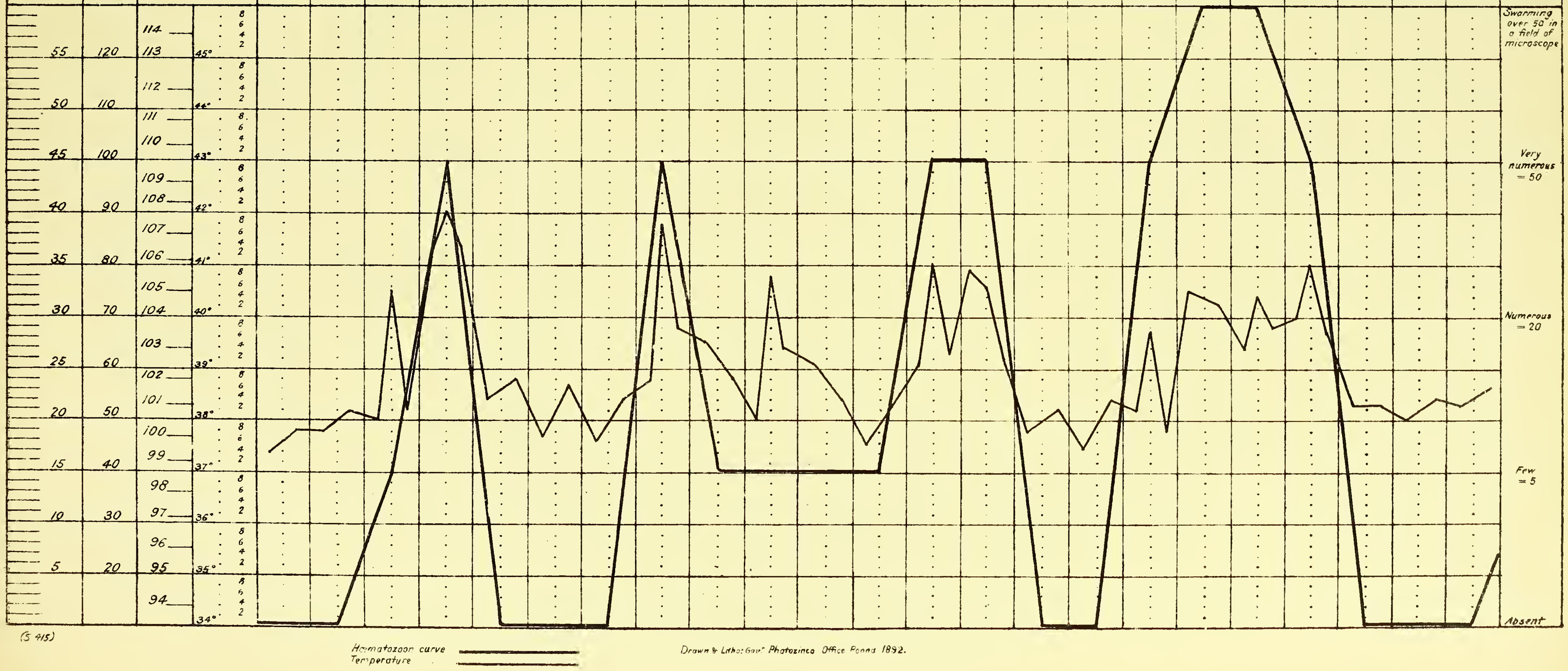
RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age ______ Sex ______ Colour ______

Disease ______ Date of Attack ______ Result ______ Date of Result ______ Register No. XXXVIII

Dates of Observation.	Sept 15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Octr 1	2	3	4	5	6	7
Days of Disease	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
Organisms in Blood	—	—	F	VN	—	—	—	VN	F	F	F	F	VN	VN	—	—	VN	S	S	VN	—	—	—
Respiration per minute / Pulse per minute / Temperature F C	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.

Record of Organisms in Blood.



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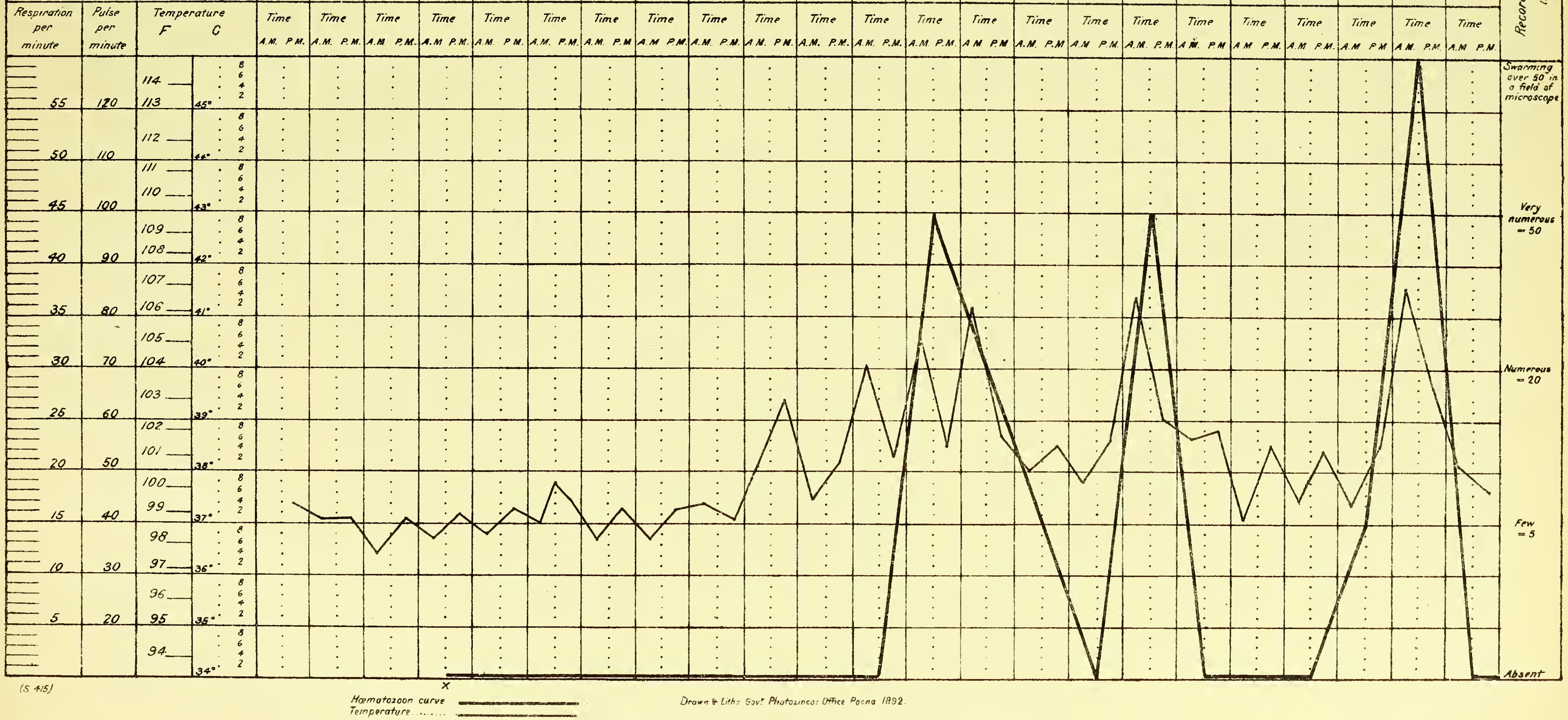
Drawn & Litho: Govt Photozinco Office Poona 1892.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Country-bred Entire ______ Age, Aged ______ Sex, Entire ______ Colour, Cream. ______

Disease, Inoculated "Surra" ______ Date of Inoculation, 27 . 8 . 91. ______ Result, Death. ______ Date of Result, 16 . 10 . 91. Register No. XXXVIII. ______

Dates of Observation.	Aug^t 23	24	25	26	27	28	29	30	31	Sep^t 1	2	3	4	5	6	7	8	9	10	11	12	13	14	Record of Organisms in Blood.
Days of Disease													1	2	3	4	5	6	7	8	9	10	11	
Organisms in Blood.					—	—	—	—	—	—	—	—	VN	N	F	—	VN	—	—	—	F	S	—	



(S 415)

Drawn & Litho Gov^t Photozinco: Office Poona 1892.

× Inoculated Subcutaneously with 1·0 cc of blood drawn from the heart of Horse No. XL_ 9½ hours P.M. Goat. blood passed through from horses.

CASE No. XLI.—BROWN C. B. MARE, *aged, in bad condition and weak.*

20th August, 1891.—Temp. A.M.	37°C.	P.M.	37·8°C.	Blood healthy.
21st „ „ „ „	36°C.	„	36·5°C.	„ „
22nd „ „ „ „	36·2°C.	„	36°C.	„ „
23rd „ „ „ „	35·5°C.	„	36·2°C.	„ „
24th „ „ „ „	35·8°C.	„	36·3°C.	„ „
25th „ „ „ „	35·7°C.	„	36·2°C.	„ „

26th „ „ 12·45 P.M.—Inoculated subcutaneously with 1 C.C. of blood over the right Scapular region, taken from the heart of Horse No. XL nine and half hours after death. The injected blood previous to the death of the animal contained very numerous hæmatozoa. Temp. A.M. 35·8°C., P.M. 36·8°C.

27th.—In the early morning 6 A.M. an Urticarial eruption was noticed on the neck, and the skin covering the angles of the jaw; the individual patches are smaller than those noticed previously, but are situated somewhat closely together. There is an oval-shaped swelling at the seat of inoculation, which measures 5″ × 2″ × 1″; it is tense and tender to the touch. Temp. A.M. 36·4°C. No hæmatozoa in the blood. Temp. P.M. 37·2°C.

28th.—The eruption is much more marked than it was yesterday; the raised patches are larger and they have extended over the scapular region and ribs on both sides. There are several petechiæ on the conjunctival membranes, of a dark-red colour. The appetite is good and the evacuations natural. Temp. A.M. 37·1°C. There are no hæmatozoa in the blood. Temp. P.M. 37·6°C.

29th.—The eruption has entirely disappeared, but the animal is weaker, and the swelling at the seat of inoculation has increased in size, and very tender on manipulation. There is an increase in the number and size of the petechiæ on the conjunctival membranes; the appetite remains good and the evacuations natural in character. Temp. A.M. 37·5°C. There are no hæmatozoa in the blood. Temp. P.M. 36·4°C.

30th.—The condition is unchanged. Temp. A.M. 36·3°C. There are no hæmatozoa in the blood. Temp. P.M. 37·1°C.

31st.—Condition unchanged. Temp. A.M. 37·4°C. There are no hæmatozoa in the blood. Temp. P.M. 37·8°C.

1st September.—The animal is dull and weaker; there is some swelling and œdema in the extremities, especially the hind ones. The membranes present a yellowish tinge, and the petechiæ on the conjunctival membranes are of a deep claret colour. The appetite continues good and the evacuations normal in character. Temp. A.M. 36·3°C. There are no hæmatozoa in the blood. Temp. P.M. 37·8°C.

2nd.—The condition of the animal is more aggravated since yesterday. The œdema of the limbs has increased, and the appetite is capricious. Temp. A.M. 36·6°C. There is a decided diminution in the size of the tumor at the seat of inoculation, and the tension and tenderness of the parts is markedly less. The hæmatozoa are very numerous in the blood. Temp. P.M. 36·7°C. The animal grew weaker during the evening and, at nine o'clock, fell; there was no struggling.

3rd.—Death took place at 4 A.M.

AUTOPSY at 10-45 A.M.

Lungs.—There are a few extravasations dotted over the surface of the organs, but lying under the visceral pleuræ.

Heart.—There are no extravasations on the external surface, but a few are present under the endocardium of the left ventricle.

Spleen.—Large, superficial extravasations.

Stomach.—Healthy.

Liver.—Healthy.

Remarks.—This animal was kept under observation from August 20th to the 26th and appeared to be in good health although in bad condition and weak; she was inoculated on the 26th with 1 C.C. of blood taken nine and half hours after death from the heart of Horse No. XL.

A rash appeared similar to that before noticed on the 27th, and on the 28th several petechiæ were noticed on the conjunctivæ of both eyes. On the 29th there was slight œdema of the hind legs and these were the only symptoms noted until September 2nd when numerous Surra hæmatozoa were found in the blood. The temperature continued very low, never rising above 37·8°C. during the whole time, and the animal fell at 9 P.M. on the 2nd and quietly died at 4 A.M. on the 3rd.

The chief points to notice in this case are :—

(i). The transmissibility of the disease by inoculation of the blood nine and half hours after death.

(ii). The weakness of the animal, whose temperature had been for some time subnormal, accounting for the sudden collapse.

(iii). The presence of an eruption on the skin which appeared the day after inoculation, and five days previous to the detection of the hæmatozoon in the blood.

(iv). The slight pathological lesions found at the *Post-mortem.*

CASE No. XL.—BROWN C. B. HORSE, *aged, in fair condition.*

12th August, 1891.—Temp. A.M.—, P.M. 36·2°C.
13th.—Temp. A.M. 35·7°C., P.M. 36·3°C. Blood healthy.
14th.— „ „ 35·6°C. „ 36·8°C. „ „
15th.— „ „ 36·6°C. „ 37°C. „ „

12th, noon.—Inoculated subcutaneously with ·6 cc. of blood over the right shoulder, taken from the Internal Jugular Vein of Horse No. XXXIV one and a quarter hours after death. The injected blood contained very numerous hæmatozoa at the time of death.

16th.—The animal appears in good health; the visible mucous-membranes are somewhat pale, but there are no petechiæ on the conjunctival membranes. The appetite is good, and the evacuations natural in character. Temp. A.M. 36·5°C. There are no hæmatozoa present in the blood. Temp. P.M. 36·4°C.

17th.—The general condition of the animal is unchanged. There is a small raised tumour, circular in form, one inch in diameter at the seat of inoculation, which is tender on manipulation. Temp. A.M. 36°C. Hæmatozoa not present in the blood. Temp. P.M. 36·5°C.

18th.—This morning an Urticarial rash is present on the neck, and along either side of the spinal column. It consists of circumscribed raised patches, oval or circular in form, but there appears to be no irritation caused by it. The swelling at the seat of inoculation has increased slightly since yesterday, and the tension and tenderness of the parts are more pronounced. There are no petechiæ on the conjunctival membranes, and the animal appears healthy; appetite good, evacuations normal. Temp. A.M. 36·2°C. Hæmatozoa absent from the blood. Temp. P.M. 36·6°C.

19th.—The eruption is still present in the same position as noted yesterday. The swelling at the seat of inoculation has increased in size and now measures two inches in diameter. Temp. A.M. 36·2°C. Hæmatozoa are absent from the blood. Temp. P.M. 37°C.

20th.—The general condition of the animal is good. The rash is still present on the neck and shoulders. The swelling at the seat of inoculation has remained stationary as regards size. Temp. A.M. 36·3°C. Hæmatozoa absent from the blood. Temp. P.M. 37·3°C.

21st.—This morning the eruption is gradually fading from the neck and shoulders of the animal. The swelling and œdema together with the tension and tenderness at the seat of inoculation have diminished during the night. The visible mucous membranes are clear and healthy; the appetite good and the evacuations normal. Temp. A.M. 39°C. The hæmatozoa are numerous in the blood. Temp. P.M. 39·2°C.

22nd.—The swelling and œdema are still further reduced in amount. The eruption has now totally disappeared. Temp. A.M. 39·6°C. Hæmatozoa very numerous in the blood. Temp. P.M. 38·5°C.

23rd.—Condition unchanged. Temp. A.M. 38·1°C. Hæmatozoa swarming in the blood. Temp. P.M. 38·5°C.

24th.—The swelling at the seat of inoculation is now only slightly raised, and the size of a rupee. The conjunctival membranes still remain free from petechiæ. The appetite is good and the evacuations normal. Temp. A.M. 38·1°C. The hæmatozoa are very numerous in the blood. Temp. P.M. 38·7°C.

25th.—The animal appears somewhat weak this morning, and the heart has become irritable. There are numerous small petechiæ on the nasal septum in the right nostril, and several much larger ones on the ala of the left nostril. The appetite is maintained and the evacuations appear healthy. Temp. A.M. 38·5°C. Hæmatozoa very numerous in the blood. Temp. P.M. 37·7°C.

26th.—The animal fell at 2 A.M. and kept eating up to the last; death took place at 3 A.M.

AUTOPSY at 12 noon, nine hours after death.

The body is fairly well nourished; there is no swelling of the extremities.

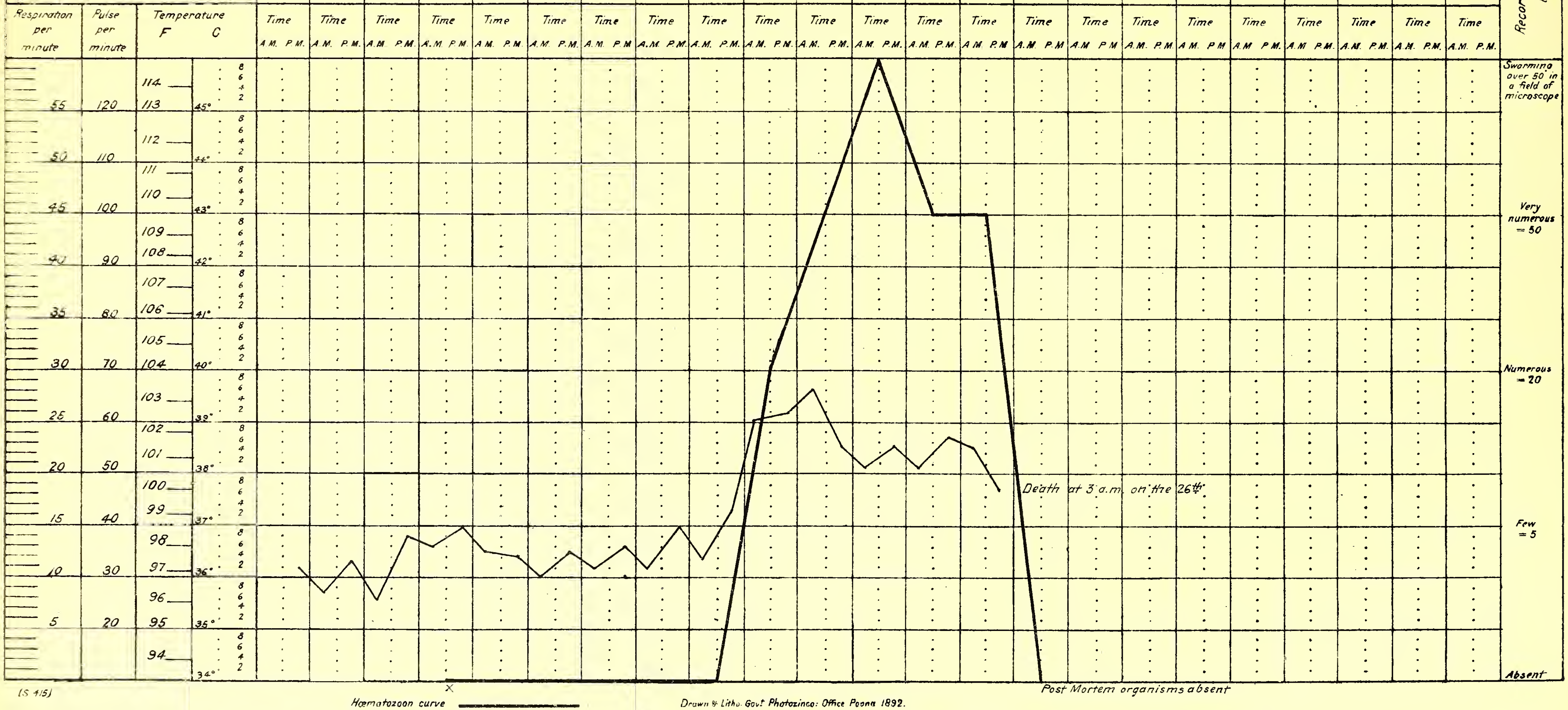
Thorax.—No fluid in the pleural cavities, and no adhesions. The lungs present localized emphysema at the apices, and along the inferior free edges. The pleural surfaces of both organs dotted over with small, somewhat circular, extravasations of blood, dark in colour, from $\frac{1}{5}$th to $\frac{1}{8}$th of an inch in diameter, and on passing the hand over the surface of the organs some hard nodules can be felt, some lying superficially, others under a layer of tissue. *On section,* the tissues present a dark-red colour, but appear healthy; the extravasations above mentioned are found to be lying under the visceral pleuræ and involve the tissues beneath to the distance of $\frac{1}{12}$th of an inch. The nodules are either hard calcareous bodies, or more caseous and soft in structure, irregular in outline and lie at different depths below the surface of the organs.

There is a small quantity of a straw-coloured fluid lying in the cavity of the *pericardium.*

Country-bred Horse ______ Age, Aged   Sex, Horse ______ Colour, Brown ______

Disease, Inoculated 'Surra' ______ Date of Inoculation, 15. 8 91 ______ Result, Death ______ Date of Result, 26. 8. 91 ______ Register No. XL ______

Dates of Observation	Aug. 12	13	14	15	16	17	18	19	20	21	22	23	24	25	26									Record of Organisms in Blood.
Days of Disease										1	2	3	4	5	6									
Organisms in Blood				—	—	—	—	—	—	N	VN	S	VN	VN										



(S 415)

Hœmatozoon curve ———
Temperature .... ———

Drawn & Litho. Govt. Photozinco: Office Poona 1892.

× Subcutaneously inoculated with 0·6 cc of blood taken from the Int. Jugular Vein of Horse No. XXXIV. 1¼ hours P. M.

Heart weighs 5 lbs. 7ozs. The base of the organ is surrounded by orange-coloured exudation which also follows the course of the coronary vessels towards the apex. The right side is dilated and the left contracted, but there are no extravasations on the surface of the muscular tissues. The *right auricle* contains some dark-coloured blood clot; the *right ventricle* also contains dark semi-fluid blood, and in the latter there are a few ecchymoses lying under the surface of the endocardium. The valves are healthy. The *left auricle* only contains a few dark-coloured blood clots. The *left ventricle* contains a large yellow-coloured clot, bathed in semi-fluid dark blood, and the clot is found to extend up the large vessels in connection with the cavity. The extravasations of blood are numerous, but small, and here and there aggregated together, the largest groups being situated on the musculi papillares, lying under the endocardium. The valves are healthy.

The muscular structure of the heart has undergone a fatty change.

Abdomen.—There is about one gallon of dark brown-coloured fluid in the cavity of the peritoneum.

The *stomach* is large, distended with gas, and contains some semi-digested food and a female lumbricoid—*Ascaris megalocephala*—nine inches in length by $\frac{1}{5}$th inch in breadth. The *cuticular* portion of the organ is healthy, but the *villous* presents several patches from two to three inches in diameter, reddish in colour, but there is no solution of continuity of the surface of the mucous membrane. There are, however, in addition to the above, three circular ulcers about the size of a two-anna silver piece; these are situated on the summits of raised eminences, are cup-shaped and remind one of the craters of miniature volcanoes. The surfaces of the ulcers are red in colour, granular, and appear to be healing.

Liver weighs 13 lbs. 1½ozs., is enlarged, and presents signs of old perihepatitis. There are numerous small grey-coloured bodies gritty to the touch, lying under the capsule of the organ. *On section,* the cut surfaces present a dark-red colour, dotted over with numerous small yellow-coloured bodies, which grated against the edge of the knife as it passed through the tissues. These bodies are easily enucleated by passing the edge of the knife over the cut surfaces.

Spleen 4 lbs. 2 ozs. There are numerous small extravasations upon the surface of the capsule. *On section* the tissue is dark in colour and soft, but appears healthy.

Kidneys.—Right weighs 1 lb. 11ozs., the left 1 lb. 9ozs. The capsules strip easily; there are no ecchymoses lying on the external cortical portion, but the organs appear rather pale.

Small Intestines present small ecchymoses dotted over the external surface, but they are found to lie under the peritoneal covering. *On section,* they are found not to invade the mucous membrane. Peyer's patches are healthy.

Large Intestines healthy.

Brain.—The superficial veins are dark in colour from the contained blood, but the convolutions present a pale colour. There is a slight increase in the quantity of fluid found in the lateral ventricles. The fluid is clear in colour, and on microscopical examination no hæmatozoa could be discovered.

Remarks.—This animal was in fair condition, and was kept under observation for three days, during which time it appeared to be in good health. On the 15th August 1891 it was inoculated with ·6 c.c. of blood taken from Horse No. XXXIV one hour and a quarter after death. The hæmatozoa were, previous to death, numerous in the blood.

No symptoms of disturbance were noted until the 18th when an eruption, Urticarial in form and similar to that noted in case No. XXXIII, appeared on the skin. On the 21st numerous hæmatozoa were present in the blood, the eruption was disappearing, and the temperature rose in the evening from 37·3°C. to 39°C. the following morning. The hæmatozoa remained very numerous from the 22nd until the 26th when they disappeared from the blood and the temperature fell rapidly. The usual symptoms of Surra were present in this case and were rapidly progressive; the animal finally sank and died. This was an aged animal with a bad constitution, and was unable to resist the disease.

The points of interest in this case are:—

(i). The first appearance of the swelling at the seat of inoculation thirty-six hours after the injection of blood.

(ii). The increase in size of the tumor accompanied by tension and tenderness of the affected part, until the morning of the fifth day after inoculation.

(iii). The appearance of an Urticarial form of eruption on the neck and either side of the spinal column, which persisted for over seventy-two hours.

(iv). The decrease in size, tension and tenderness of the tumor at the seat of inoculation and the simultaneous appearance of hæmatozoa in numbers in the general circulation.

(v). The first appearance of the hæmatozoon in the blood took place six days after the subcutaneous inoculation of the animal.

(vi). The extensive pathological lesions involving the lungs, heart and stomach, and the presence of an *Ascaris Megalocephala* in the cavity of the latter.

CASE No. XXXI.—BROWN C. B. HORSE, *aged, in fair condition and tolerably healthy.*

7th July, 1891.—Temp. A.M.—, P.M. 36·6°C. Blood healthy.
8th „ „ „ 36·1°C. „ 36·3°C. „ „
9th „ „ „ 36°C. „ 36°C. „ „
10th „ „ „ 36·7°C. „ 37°C. „ „
11th „ „ „ 36·2°C. „ 37·3°C. „ „

Inoculated the animal subcutaneously over the left shoulder with 0·3 c.c. of blood taken from the right ventricle, eight hours after death, of Horse No. XXXIII.

12th.—The animal appears in good health; there are no petechiæ on the conjunctival membranes; the appetite is good, and the evacuations are normal in character. Temp. A.M. 36·8°C. There are no hæmatozoa in the blood. Temp. P.M. 37·6°C.

13th.—The condition of the animal is unchanged. Temp. A.M. 36·2°C. There are no hæmatozoa in the blood. Temp. P.M. 37·5°C.

14th.—Condition unchanged. Temp. A.M. 36·3°C. No hæmatozoa in the blood. Temp. P.M. 37°C.

15th.—There is no swelling or œdema to denote the seat of inoculation. Temp. A.M. 35·7°C. No hæmatozoa in the blood. Temp. P.M. 36·8°C.

16th.—Condition unchanged. Temp. A.M. 36·4°C. No hæmatozoa in the blood. Temp. P.M. 36·7°C.

17th.—Condition unchanged. Temp. A.M. 36·3°C. No hæmatozoa in the blood. Temp. P.M. 36·6°C.

18th.—No change has taken place at the seat of inoculation, and there is no thickening to be felt in the subcutaneous tissue; the animal has as yet shown no signs of disease and there are no petechiæ on the conjunctival membranes. Temp. A.M. 36·6°C. There are no hæmatozoa in the blood. Temp. P.M. 36·8°C.

19th.—There is no change in the condition of the animal, and no swelling or œdema at the seat of inoculation. Temp. A.M. 37°C. No hæmatozoa in the blood. Temp. P.M. 37·2°C.

20th.—Condition of the animal is unchanged. Temp. A.M. 38·2°C. The hæmatozoa appeared for the first time this morning and are numerous in the blood. Temp. P.M. 38·3°C.

21st.—The animal appears dull, and there are a few petechiæ small in size on the conjunctival membranes; the appetite remained good and the evacuations normal in character. Temp. A.M. 39·8°C. The hæmatozoa are swarming in the blood. Temp. P.M. 39·6°C.

22nd.—The condition of the animal is unchanged. Temp. A.M. 39·4°C. Hæmatozoa are very numerous in the blood. Temp. P.M. 39·7°C.

23rd.—Condition unchanged. Temp. A.M. 38·5°C. Hæmatozoa very numerous in the blood. Temp. P.M. 38·4°C.

24th.—Condition unchanged. Temp. A.M. 37·5°C. Hæmatozoa numerous in the blood. Temp. P.M. 37·8°C.

25th.—Condition unchanged. Temp. A.M. 36·9°C. Hæmatozoa very numerous. Temp. P.M. 37·2°C.

26th.—There is no change at the point of inoculation, and the animal's condition is unaltered. Temp. A.M. 36·8°C. Hæmatozoa very numerous in the blood. Temp. P.M. 37·4°C.

27th.—Condition unchanged. Temp. A.M. 39·7°C. Hæmatozoa numerous in the blood. Temp. P.M. 38°C.

28th.—The condition of the animal is unaltered; there is now slight œdema of the extremities, but it is not painful on pressure. Temp. A.M. 37·6°C. The hæmatozoa are numerous in the blood. Temp. P.M. 38°C.

29th.—Condition unchanged. Temp. A.M. 37·7°C. The hæmatozoa are few in the blood. Temp. P.M. 37·5°C.

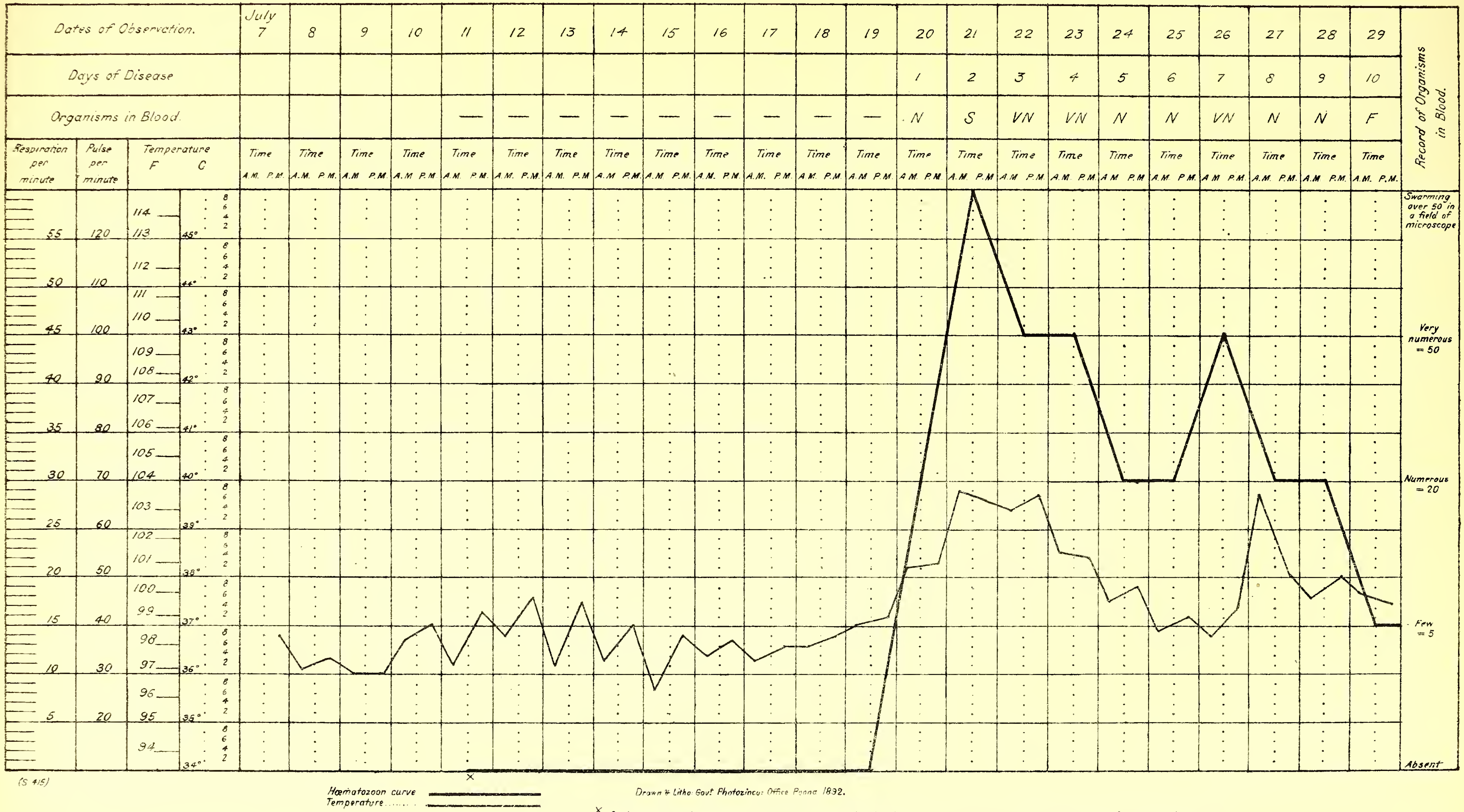
30th.—The animal is brighter to-day; the appetite is good and the evacuations normal. Temp. A.M. 36·5°C. The hæmatozoa are few in the blood. Temp. P.M. 37·6°C.

31st.—Condition of the animal is not so good as yesterday; it looks dull and somnolent. There is a fresh crop of petechiæ on the conjunctival membranes, but the appetite remains good and the excretions normal. Temp. A.M. 38·8°C. The hæmatozoa are very numerous in the blood. Temp. P.M. 38·4°C.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Country-bred Horse ______ Age, Aged Sex, Horse Colour, Brown ______

Disease. Inoculated Surra ______ Date of Inoculation, 11. 7. 1891. ______ Result, Death ______ Date of Result, 2. 8. 91 ______ Register No. XXXI ______



(S 415)

Drawn & Litho: Govt Photozinco: Office Poona 1892.

× Subcutaneously inoculated with 0·3cc of blood taken from the right ventricle of Horse No XXXIII. 8 hours P.M.

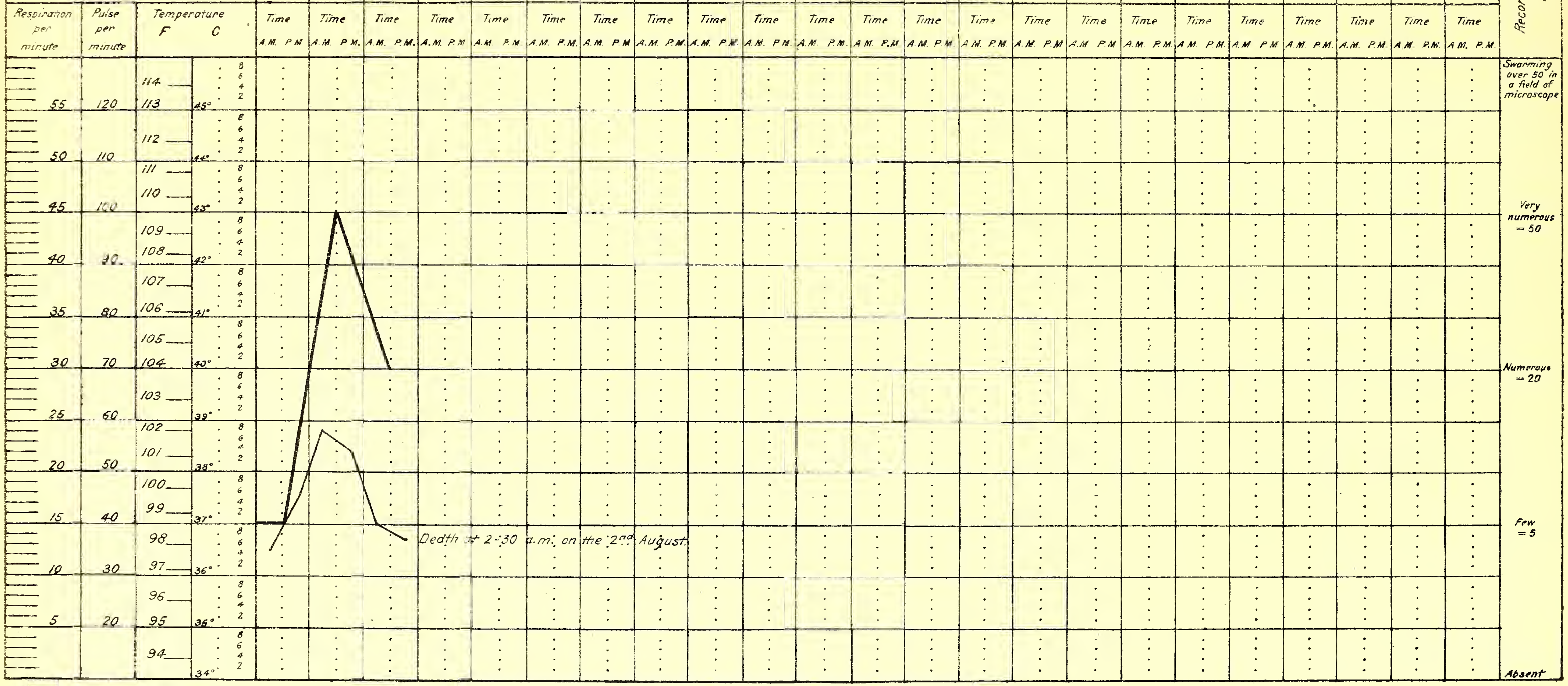
TEMPERATURE, PULSE AND RESPIRATION.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age ______ Sex ______ Colour ______

Disease ______ Date of Attack ______ Result ______ Date of Result ______ Register No. XXXI

Dates of Observation	July 30	31	Aug. 1	2
Days of Disease	11	12	13	14
Organisms in Blood	F	VN	N	



(G. 415)

Hæmatozoon curve ━━━

Temperature ───

Drawn & Litho Govt Photozinco: Office Poona 1892.

1st August.—The animal is weaker, and the swelling and œdema of the extremities has increased in amount; the visible mucous membranes are tinged yellow and there are large petechiæ on the conjunctival membranes; the appetite however continues to be good. Temp. A.M. 37°C. The hæmatozoa are numerous in the blood. Temp. P.M. 36·7°C.

2nd.—Death took place somewhat suddenly at 2-30 A.M.

AUTOPSY at 10-30 A.M., eight hours after death. The body is emaciated; there is some slight swelling and œdema of the extremities, but there is none on the under-surface of the abdomen.

Thorax.—There is no fluid in the pleural cavities or adhesions of the pleuræ.

Lungs.—There are some ecchymoses at the apices of the organs, and a patch of localized consolidation six inches square involves the left anterior lobe. The surfaces of the visceral pleuræ present dotted over them here and there numerous small extravasations of blood somewhat circular in form and varying in size from $\frac{1}{4}$th to $\frac{1}{8}$th of an inch in diameter. These extravasations lie under the visceral pleuræ, and involve the tissue of the lung to a very limited extent.

Heart weighs 6 lbs. 13 ozs., is very large, and has undergone considerable hypertrophy with dilatation. The cavities contain yellow-coloured clot and both ventricles are the seat of numerous and extensive sub-endocardial extravasations.

Liver presents a few calcareous bodies $\frac{1}{8}$th inch in diameter, circular or nearly so in shape and of a yellow colour. *On section,* the tissues look healthy and there are a few calcareous bodies visible.

Spleen weighs 4 lbs. 10 ozs. There are numerous petechiæ on the surface of the capsule, brick-red in colour. *On section,* the tissues are soft but appear healthy.

Stomach.—The external surface of the organ is healthy.

On section the cavity contains some semi-digested food. There are a few small patches of congestion on the mucous membrane of the *villous* portion, about two inches from the pylorus, and these are found to involve the mucous membrane only.

Kidneys.—The right weighs 1 lb. 5 ozs., the left 1 lb. 6 ozs. The capsules strip easily and are somewhat pale. *On section,* the organs are pale in colour, but healthy in appearance.

Intestines present nothing pathological.

The points of interest in this case are :—

(i). That the animal was inoculated with ·3 c. c. of blood removed from the right ventricle of the heart of Horse No. XXXIII eight hours after death. The animal had previously been inoculated with fluid from the tunica vaginalis testis of Goat No. III.

(ii). The period of incubation from the time of the subcutaneous inoculation to the discovery of the hæmatozoon in the blood was nine days.

(iii). The entire absence of all swelling and œdema from the seat of inoculation.

(iv). The somewhat sudden death on the twenty-second day after inoculation.

(v). The extensive pathological lesions, *viz.*, circumscribed patch of consolidation involving the anterior lobe of the left lung, together with those of the spleen and stomach.

CASE No. L.—BROWN AUSTRALIAN MARE, *aged, 16 hands.*

15th October, 1891.—Inoculated subcutaneously over the left Scapular Region with 2 c. c. of blood serum, drawn from the Jugular Vein of Horse No. XXXVIII after clotting had taken place, forty-five minutes *post-mortem*. Temp. p.m. 37·2°C.

16th.—Temp. a.m. 37·2°C., p.m. 37·4°C. Blood healthy. There are no conjunctival ecchymoses and no sign of swelling at the seat of inoculation.

17th.—Temp. a.m. 37·2°C., p.m. 37·7°C. Blood healthy.

18th.—There is one ecchymosis on the right membrana nictitans, but no swelling or œdema at the seat of inoculation, although there is some swelling of the left mammary gland. Temp. a.m. 37·3°C. No hæmatozoa in the blood. Temp. p.m. 37·6°C.

19th.—There is some slight swelling at the seat of inoculation, and the left mammary gland is increased in size; there is tenderness on manipulation in both situations. Temp. a.m. 37·6°C. No hæmatozoa in the blood. Temp. p.m. 38°C.

20th.—The swelling and œdema at the seat of inoculation has extended since yesterday, and the condition of the mammary gland remains unchanged. Temp. a.m. 38·3°C. P. 60. R. 15. There are no hæmatozoa in the blood. Temp. p.m. 38·4°C.

21st.—The condition of the swelling at the seat of inoculation and that of the mammary gland remain unchanged. Temp. a.m. 39·4°C. Hæmatozoa absent from the blood. Temp. p.m. 40·9°C.

22nd.—There is considerable swelling and œdema of the off hind limb from the coronet up to the knee, but it is not painful on manipulation. There are several petechiæ on the right membrana nictitans. Temp. a.m. 39·5°C. No hæmatozoa in the blood. Temp. p.m. 39·3°C.

23rd.—The condition of the animal is unchanged. Temp. a.m. 38·3°C. No hæmatozoa in the blood. Urine, turbid, viscid, orange in colour. Sp. Gr. 1,032, alkaline. Temp. p.m. 38·5°C.

24th.—The animal is dull and the head hangs down; the petechiæ have increased in number on the conjunctival membranes. The appetite is not so good as it has been since the date of inoculation. The swelling at the seat of inoculation is soft and some of the tension and tenderness of the parts has disappeared. Temp. a.m. 37·8°C. The hæmatozoa are very numerous in the blood. Urine, turbid, viscid, reddish-yellow in colour. Sp. Gr. 1,034, alkaline. Temp. p.m. 40·6°C.

25th.—The animal still continues dull, the skin is hot, and the visible mucous membranes present a dusky pallor. Temp. a.m. 41°C. Hæmatozoa are numerous in the blood. Urine, turbid, reddish in colour. Sp. Gr. 1,016., neutral. Temp. 1 p.m. 40·8°C., 5 p.m. 39·6°C.

26th.—There is an Urticarial eruption on both sides of the neck; the individual patches are oval in form, and raised above the surrounding skin. On manipulation these small tumors appear to be distended with jelly-like material. Temp. a.m. 37·8°C. Hæmatozoa are absent from the blood. Urine, turbid, viscid, orange in colour. Sp. Gr. 1,026, alkaline. Temp. p.m. 38·5°C.

27th.—The eruption has all disappeared this morning and the animal is much brighter; the appetite is good and the evacuations normal. Temp. a.m. 39°C. P. 64. R. 30. Hæmatozoa few in the blood. Urine, turbid, viscid, greenish-brown in colour Sp. Gr. 1,028, alkaline, a trace of albumen, Carbonates, no phosphates. Temp. p.m. 39°C.

28th.—The condition is unchanged, except that there are extensive ecchymoses on both conjunctival membranes. Appetite good. Temp. a.m. 38·4°C. Hæmatozoa absent from the blood. Urine, turbid, viscid, greenish-brown in colour. Sp. Gr. 1,024, alkaline, a trace of albumen, Carbonates, Oxalates, no phosphates. Temp. p.m. 38·4°C.

29th.—The animal continues to be brighter, and feeds well. Temp. a.m. 37·4°C. Hæmatozoa absent from the blood. Urine, turbid, viscid, orange in colour. Sp. Gr. 1,036, alkaline, a trace of albumen, Carbonates, no phosphates. Temp. p.m. 37·6°C.

30th.—The condition of the animal is unchanged. Temp. a.m. 40°C. Hæmatozoa numerous in the blood. Urine, turbid, viscid, dirty orange. Sp. Gr. 1,032, alkaline, a trace of albumen, no phosphates, Carbonates. Temp. 1 p.m. 41·3°C., 5 p.m. 40·4°C.

31st.—The visible mucous membranes are pale; the conjunctival membranes are dotted over with ecchymoses especially the membrana nictitans of both eyes. There is some swelling of the extremities, especially the off hind limb which has continued large since the 22nd instant. The appetite is very good and the evacuations are normal. Temp. a.m. 39·7°C. Hæmatozoa are very numerous in the blood. Urine, turbid, viscid, dirty orange in colour. Sp. Gr. 1,036, alkaline, a trace of albumen, and Carbonates, no phosphates. Temp. 5 p.m. 38·3°C.

1st November.—The condition of the animal is unchanged. Temp. A.M. 39·3°C. Hæmatozoa very numerous in the blood. Temp. 1 P.M. 40·3°C. Urine, turbid, viscid, dirty yellowish-brown in colour, Sp. Gr. 1,026, alkaline, and contains a trace of albumen, and numerous crystals of Carbonate of Calcium. Temp. 5 P.M. 40·7°C.

2nd.—The animal is brighter this morning and the colour of the conjunctival ecchymoses is growing fainter; the appetite continues good. Temp. A.M. 38·3°C. Hæmatozoa are few in the blood. Temp. 1 P.M. 38·8°C. Urine is turbid, viscid, yellowish-brown in colour. Sp. Gr. 1033, alkaline and contains a trace of albumen, and a few crystals of Carbonate of Calcium. Temp. 5 P.M. 38·8°C.

3rd.—The condition of the animal is unchanged. Temp. A.M. 38·2°C. Hæmatozoa absent from the blood. Temp. 1 P.M. 38·5°C. Urine, turbid, viscid, brown in colour, Sp. Gr. 1,040, alkaline, contains a trace of Carbonate. Temp. 5 P.M. 38·2°C.

4th.—The condition of the animal is unchanged. Temp. A.M. 37·8°C. Hæmatozoa few in the blood. Temp. 1 P.M. 38·2°C. Urine, turbid, viscid, orange in colour. Sp. Gr. 1,029, neutral, a trace of albumen, no Carbonates. Temp. P.M. 39°C.

5th.—The animal presents a dull condition this morning and the conjunctival mucous membranes present fresh ecchymoses; the appetite is not so good, but the fæcal evacuations appear healthy. Temp. A.M. 38·7°C. Urine, clear, reddish in colour, Sp. Gr. 1,032, acid, a trace of albumen, no Carbonates or phosphates. Temp. 5 P.M. 39·5°C.

6th.—Condition unchanged. Temp. A.M. 39·2°C. Hæmatozoa numerous in the blood. Temp. 1 P.M. 38·7°C. Urine, clear, orange, Sp. Gr. 1,024, acid, a trace of albumen, absence of Carbonates and phosphates. Temp. 5 P.M. 39°C.

7th.—The animal is weaker; there is a muco-purulent discharge from the right nostril, but no ulceration to be seen. There is a considerable amount of vermicular movement in the intestine and gurgling of its contents. The anal sphincter is relaxed and the gut patent. Temp. A.M. 39·1°C. The hæmatozoa are numerous in the blood. Temp. 1 P.M. 39·6°C. Urine, clear, transparent, orange in colour. Sp. Gr. 1030, acid, contains a trace of albumen. Temp. 5 P.M. 39·4°C.

8th.—The condition of the animal is unchanged. Temp. A.M. 39·8°C. Hæmatozoa numerous in the blood. Temp. 1 P.M. 40·6°C. Urine, clear, orange in colour, Sp. Gr. 1,030, acid, contains a trace of albumen. Temp. 5 P.M. 40·4°C.

9th.—General condition unchanged. The muco-purulent discharge from the nasal passages continues; there is some œdema of the under-surface of the abdomen and the animal has developed a cough. Temp. A.M. 40·5°C. The hæmatozoa are numerous in the blood. Temp. 1 P.M. 41°C. Urine, clear, orange, Sp. Gr. 1,028, acid, a trace of albumen. Temp. 5 P.M. 40·6°C.

10th.—The discharge from the nasal passages has diminished in quantity and the cough is better. Temp. A.M. 39·6°C. The hæmatozoa are absent from the blood. Temp. 1 P.M. 40·5°C. Urine, clear, orange. Sp. Gr. 1025, acid, a trace of albumen. Temp. P.M. 40°C.

11th.—There is still a slight discharge from the nasal passages, and also from the eyes. The capillaries of the nasal septum are congested, but there is no sign of ulceration. Temp. A.M. 40·5°C. The hæmatozoa are absent from the blood. Temp. 1. P.M. 40·5°C. Urine, clear, orange in colour. Sp. Gr. 1023, acid, contains a trace of albumen. Temp. 5 P.M. 40·2°C. P. 84. R. 44.

12th.—The œdema on the under-surface of the abdomen has not increased in amount. The gurgling in the intestines continues, and the relaxed condition of the anal sphincter; the appetite is good. Temp. A.M. 39·4°C. The hæmatozoa are absent from the blood. Temp. 1 P.M. 40·3°C. P. 84. R. 40. Urine, clear, orange, Sp. Gr. 1,032, acid, contains a trace of albumen. At 3-55 P.M. the animal fell. Temp. 40·6°C. P. 72. R. 38. The respiration appears to be entirely abdominal; there is little or no movement of the chest. At 4-45 P.M. Temp. was 40·6°C. P. 72. R. 41. 5 P.M.—As the animal is making fruitless attempts to regain the upright position, and as there is some chance of its living some hours, Chloroform was administered, and death took place at 5-5 P.M.

AUTOPSY.—Animal somewhat emaciated; especially the muscles about the hips show signs of wasting. There is œdema of the hind limbs. There is some yellow-coloured exudation of a semi-solid character in the subcutaneous tissue of the abdomen.

Thorax.—There is absence of fluid and adhesions of the pleural surfaces. The left lung is dark in colour and full of blood which readily escapes on section and is due to hypostatic congestion. The right appears healthy. There are no ecchymoses on the surface of the lungs lying beneath the visceral pleuræ, as so commonly present in previous cases, and there is likewise an absence of round caseous nodules.

Heart.—Weighs 5 lbs. 12 ozs. There are a few ecchymoses lying on either side of the course of the coronary vessels, with a small amount of yellow jelly-like exudation. The *right auricle* is full of blood clots, but there are no ecchymoses. The *right ventricle* is also full of dark-coloured blood clots and on their removal numerous large sub-endocardial extravasations of blood are observed, chiefly involving the thick portion of the musculi papillares. The *left auricle* is full of dark clots, but there are no ecchymoses. The *left ventricle* contains dark blood clot, with a large buff-coloured one running up into the aortic opening. The endocardial lining is stained by the blood pigment, but there are no extravasations. The several valves are healthy.

Spleen weighs 11 lbs. 6½ ozs. Enormously enlarged. There are no extravasations on the surface of the capsule. The tissue on section is firm and healthy in appearance.

Liver weighs 22 lbs. 2½ ozs., is enormous. The organ is dark in colour and presents several irregular-shaped nodules, yellow in colour, half imbedded in the superficial tissue under the capsule, and the other half projecting on the surface. *On section,* the tissues are dark in colour, but no caseous nodules are visible imbedded in them.

Stomach large, containing semi-digested food. The *cuticular* and *villous* portions are pale but present no ulceration, but there are three small raised lumps lying under the mucous membrane of the villous portion about one inch on the pyloric side of the line of demarcation between the two structures. These small raised tumors are formed by the *Spiroptera megastoma* and are hard and present a small opening on the summit which, on section, is circular and communicates with the interior of these irregular cavities. There are two larvæ of the 'Gastrophilus equi' attached to the mucous membrane of the cuticular portion.

Kidneys.—Right weighs 2 lbs. ½ oz., left 2 lbs. 3 ozs. The capsules strip easily; there are no petechiæ. *On section,* the cortical portions appear pale and the medullary portions rather darker in colour, but otherwise they appear healthy.

Intestines.—The small intestines are perfectly healthy. The large intestines are perfectly healthy. On opening the nasal passages the mucous membranes covering the turbinated bones are found to be deeply congested and of a dark-purple colour, but no ulcerations are to be seen.

The points of interest in this case are :—

(i). That the disease was successfully transmitted by the inoculation of 2 c.c. of faintly yellow-tinged blood serum drawn from the Internal Jugular Vein of Horse No. XXXVIII, forty-five minutes after death.

(ii). The presence of an Urticaria over the neck, two days after the appearance of the hæmatozoon in the general circulation, but the absence of the hæmatozoon from the blood during the persistence of the eruption.

(iii). The pathological sub-endocardial lesions found in the right but which were absent from the left ventricle, and the tumefied and congested condition of the Schneiderian membrane accounting for the persistence of the muco-purulent discharge from the nasal passages during life.

RECORDS OF URINE.

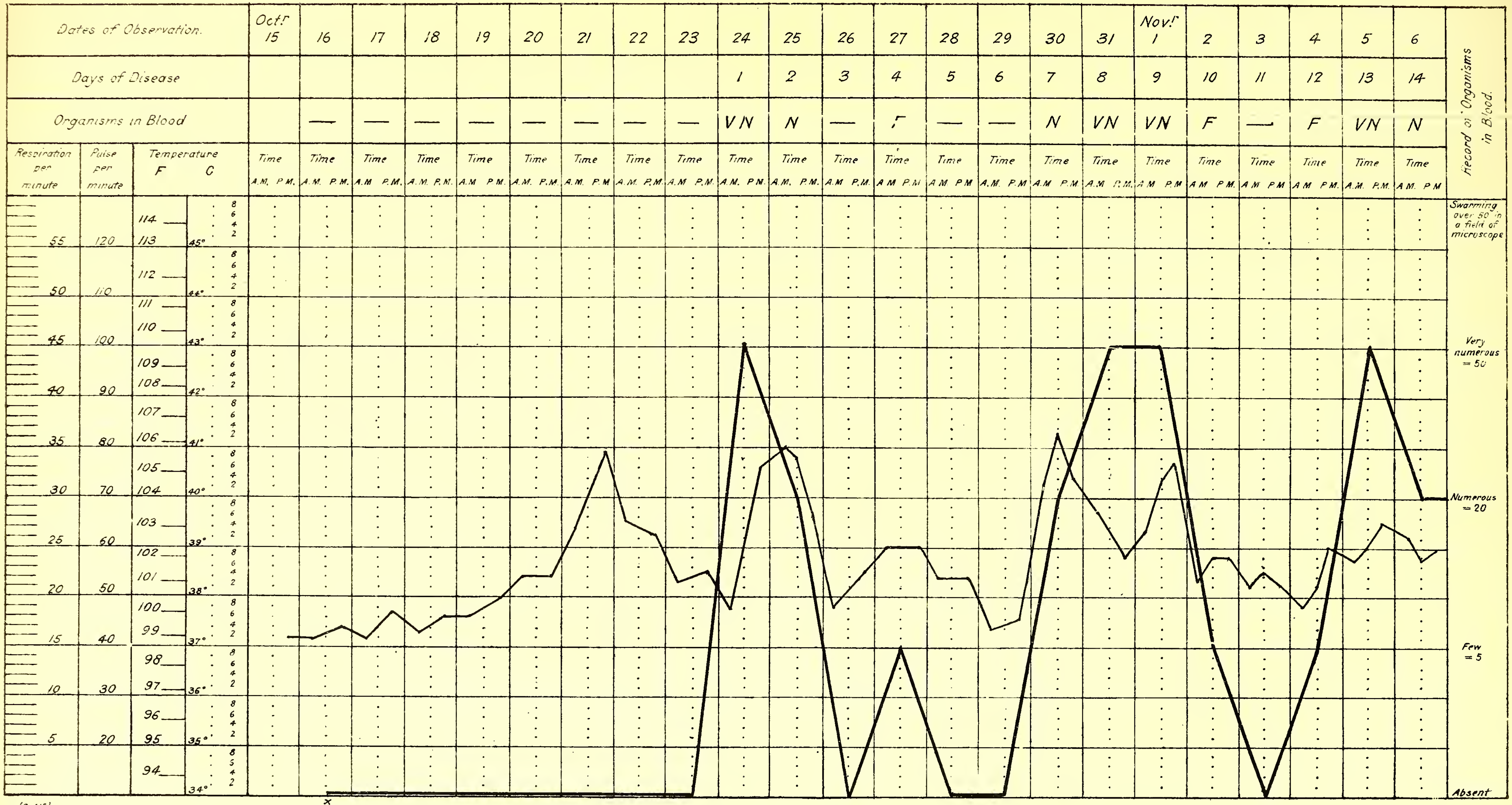
Animal, Australian Mare No. L. *Date* { *Inoc: 15th October 1891.*
Death 12th November 1891.

Disease, Surra.

Date.	Quantity.	Colour.	Re-action.	Specific Gravity.	Albumen.	Phosphates.	REMARKS.
1891. October 15	......	Turbid, reddish-yellow.	Alkaline	1,020	No	No	Carbonates.
23	......	Turbid, viscid, orange.	Do.	1,032	No	No	,,
24	......	Turbid, viscid, reddish-yellow.	Do.	1,034	No	No	,,
25	......	Turbid, viscid, reddish.	Do.	1,016	No	No	,,
26	......	Turbid, viscid, orange.	Do.	1,026	No	No	,,
27	......	Turbid, viscid, greenish-brown.	Do.	1,028	A trace.	No	,,
28	......	Do. do.	Do.	1,024	A trace.	No	Carbonates oxalates of calcium.
29	......	Turbid, viscid, orange.	Do.	1,036	A trace.	No	Carbonates.
30	......	Turbid, viscid, dirty-orange.	Do.	1,032	A trace.	No	,,
31	......	Do. do.	Do.	1,032	A trace.	No	,,
November 1	......	Turbid, viscid, yellowish-brown.	Do.	1,026	A trace.	No	,,
2	......	Do. do.	Do.	1,033	A trace.	No	Carbonate, a trace.
3	......	Turbid, viscid, brown.	Do.	1,040	A trace.	No	,,
4	......	Turbid, viscid, orange.	Neutral	1,029	A trace.	No	No carbonates.
5	......	Clear, reddish	Slightly acid.	1,032	A trace,	No	,,
6	......	Clear, orange	Acid	1,024	A trace.	No	,,
7	......	Do.	Do.	1,030	A trace.	No	,,
8	......	Do.	Do.	1,030	A trace.	No	,,
9	......	Do.	Do.	1,028	A trace.	No	,,
10	......	Do.	Do.	1,025	A trace.	No	,,
11	......	Do.	Do.	1,023	A trace.	No	,,
12	......	Do.	Do.	1,032	A trace.	No	,,

Australian Mare — Age, Aged. — Sex, Mare. — Colour, Brown.

Disease, Inoculated "Surra". — Date of Inoculation, 15 . 10 . 1891. — Result, Death. — Date of Result, 12 . 11 . 91. — Register No. L.



(S 415)

Hæmatozoon curve ———

Temperature ......

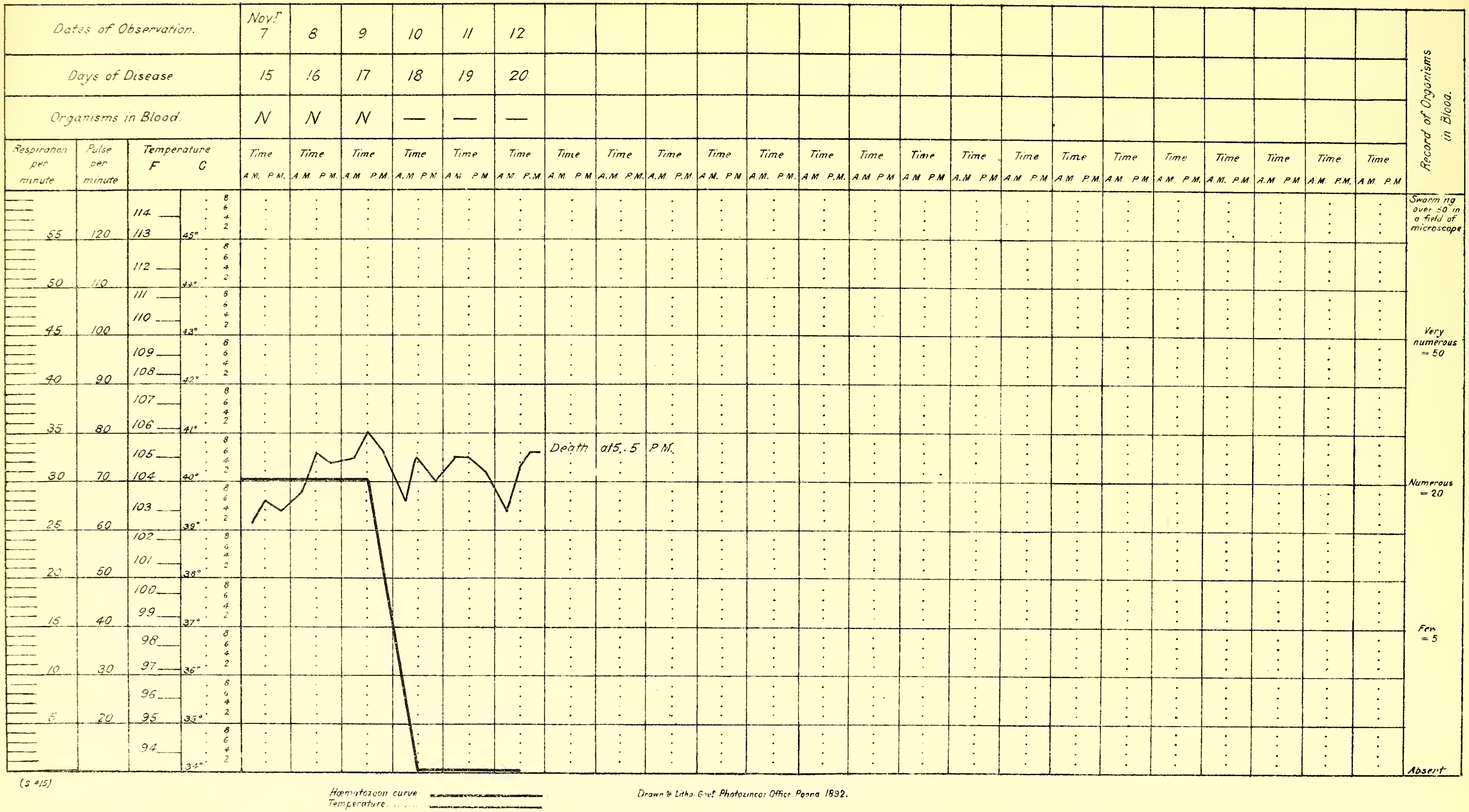
Drawn & Litho. Govt. Photozinco: Office Poona 1892.

x Subcutaneously inoclated with 2. cc. of blood Serum. 45 minutes P.M.
The blood was drawn from the Internal Jugular Vein of Horse No. XXXVIII.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age ______ Sex ______ Colour ______

Disease ______ Date of Attack ______ Result ______ Date of Result ______ Register No. L.



(S #15)

Drawn & Litho. Govt Photozinco: Office Poona 1892.

APPENDIX VII.

EXPERIMENTAL CASES.

VARIOUS ANIMALS INOCULATED WITH SURRA HORSE BLOOD AND OTHER FLUIDS.

Donkey No I.
Bull—
  Guinea-Pigs.

Sheep—
  Guinea-Pigs.
Goats Nos. I, II, III.
Rabbits.
Guinea-Pigs.
Rats (*Mus decumanus*).
Rats (*Nesokia providens*).
Fowls.
Pigeons.

DONKEY No. I.—Entire, aged, but fairly healthy.

30th January 1893.—On admission:—The animal appears to be in fairly good health. It has been hard-worked, and not well fed. The visible mucous membranes are pale, but clear; the limbs fine. Temp. A.M. 35°C. P. 40. R. 12. On microscopical examination the red corpuscles are found to form healthy rouleaux, the white corpuscles are normal as regards size and number. There are a few large colourless lymphoid corpuscles, and the eosinophile corpuscles are numerous. The blood is however free from nematodes and hæmatozoa. Temp. 1 P.M. 36·2°C. Urine, turbid, bright-yellow in colour, Sp. Gr. 1,040, alkaline, contains no albumen, but numerous crystals of Carbonate of Calcium. Temp. 5 P.M. 38°C. P. 48. R. 12.

31st.—The condition of the animal is unchanged. Temp. A.M. 35°C. P. 40. R. 12. The blood presents a healthy appearance. Temp. 1 P.M. 37·8°C. Temp. 5 P.M. 38·2°C. P. 44. R. 16.

1st February.—The condition of the animal is unchanged. Temp. A.M. 35·4°C. P. 40. R. 12. The blood presents a healthy appearance. Temp. 1 P.M. 37·8°C. Temp. 5 P.M. 38·2°C. P. 48. R. 12.

2nd.—The condition of the animal is unchanged. Temp. A.M. 35·4°C. P. 40. R. 12. The blood presents a healthy appearance. Temp. 1 P.M. 36·4°C. Temp. 5 P.M. 39°C. P. 56. R. 20.

3rd.—The condition of the animal is unchanged. Temp. A.M. 36·2°C. P. 40. R. 12. The blood presents a healthy appearance. Temp. 1 P.M. 37·6°C. Temp. 5 P.M. 39°C. P. 56. R. 16.

4th.—The condition of the animal is unchanged. Temp. A.M. 36°C. P. 40. R. 12. The blood presents a healthy appearance. Temp. 1 P.M. 38·1°C. Temp. 5 P.M. 38·4°C. P. 52. R. 16.

5th.—The condition of the animal is unchanged. Temp. A.M. 36·4°C. P. 40. R. 8. The blood presents a healthy appearance. Temp. 1 P.M. 37·8°C. Temp. 5 P.M. 38·6°C. P. 60. R. 32.

6th.—The condition of the animal is unchanged. Temp. A.M. 37°C. P. 44. R. 16. The blood presents a healthy appearance. Temp. 1 P.M. 38·4°C. Urine, turbid, bright-yellow in colour, Sp. Gr. 1,042, alkaline, contains no albumen but numerous crystals of Carbonate and Oxalate of Calcium. Temp. 5 P.M. 38·4°C. P. 56. R. 24.

7th.—The condition of the animal is unchanged. Temp. A.M. 36·3°C. P. 40. R. 12. The blood presents a healthy appearance. Temp. 1 P.M. 36·6°C. Urine, passed but none collected. Temp. 5 P.M. 37·4°C. P. 44. R. 16.

8th.—The condition of the animal is unchanged. Temp. A.M. 35°C. P. 32. R. 12. The blood presents a healthy appearance. Temp. 1 P.M. 35·8°C. Urine, passed but none collected. Temp. 5 P.M. 37°C. P. 40. R. 16.

9th.—The condition of the animal is unchanged. Temp. A.M. 35·6°C. P. 32. R. 8. The blood presents a healthy appearance. Temp. 1 P.M. 37°C. Urine, turbid, viscid, bright-yellow in colour, Sp. Gr. 1,044, alkaline, contains no albumen but Carbonate and a few Oxalate of Calcium crystals. Temp. 5 P.M. 37·2°C. P. 32. R. 12. 5-30 P.M. Inoculated subcutaneously with 2·0c.c. of blood containing numerous hæmatozoa taken from the Jugular Vein of Horse No. LXXXIV immediately after death.

10th.—The condition of the animal is unchanged. There is no swelling or œdema at the seat of inoculation. Temp. A.M. 35·6°C. P. 32. R. 8. The hæmatozoon is absent. Temp. 1 P.M. 37·6°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,054, alkaline, contains no albumen, but Carbonate crystals. Temp. 5 P.M. 38°C. P. 52. R. 12.

11th.—The condition of the animal is unchanged. A slight thickening in the subcutaneous tissues can be felt at the point of inoculation. Temp. A.M. 35·6°C. P. 68. R. 12. There are no hæmatozoa in the blood. Temp. 1 P.M. 36·8°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,054, alkaline, contains no albumen. Temp. 5 P.M. 37·4°C. P. 36. R 12.

12th.—The condition of the animal remains unchanged, with this exception that the breathing is hurried but not laboured. There is no increase in the amount of subcutaneous thickening at the point of inoculation. Temp. A.M. 35·6°C. P. 32. R. 12. There are no hæmatozoa in the blood. Temp. 1 P.M. 38·2°C. Urine, turbid, viscid, orange in colour, Sp. Gr. 1,060, alkaline, contains no albumen. Temp. 5 P.M. 38°C. P. 52. R. 16.

13th.—This morning the animal presents a bright appearance, and walks about as usual. Temp. A.M. 36·2°C. P. 48. R. 32. The blood contains a few hæmatozoa. Temp. 1 P.M. 37·9°C. Urine, passed but none collected. Temp. 5 P.M. 38·2°C. P. 44. R. 20.

14th.—The condition of the animal is unchanged, with this exception that there are a few small petechiæ, dark-red in colour, on the right conjunctiva. Temp. A.M. 37°C. P. 44. R. 12. There are numerous hæmatozoa in the blood. Temp. 1 P.M. 38·4°C. Urine, turbid, orange in colour, Sp. Gr. 1,038, alkaline, contains no albumen; crystals of Carbonate of Calcium. Temp. 5 P.M. 39·2°C. P. 64. R. 16.

15th.—The general condition of the animal is unchanged. Temp. A.M. 40·1°C. P. 60. R. 16. The hæmatozoa are very numerous in the blood. Temp. 1 P.M. 40·2°C. Urine, passed but none collected. Temp. 5 P.M. 41°C. P. 68. R. 24. Notwithstanding the height of the temperature, the appetite appears to be unaffected, and it would be impossible to diagnose that the animal was ill, from mere inspection.

16*th*.—The condition of the animal is unchanged. There is no swelling or œdema of the extremities, or sheath; appetite unimpaired. Temp. A.M. 39·4°C. P. 56. R. 16. The hæmatozoa are swarming in the blood. Temp. 1 P.M. 40·2°C. Urine passed but none collected. Temp. 5 P.M. 40°C. P. 60. R. 20.

17*th*. The condition of the animal is unchanged. Temp. A.M. 39·7°C. P. 80. R. 16. The hæmatozoa are very numerous in the blood Temp. 1 P.M. 40·2°C. Urine, turbid, orange in colour, Sp. Gr. 1,022, alkaline, contains no albumen; crystals of Carbonate and a few Oxalate of Calcium. Temp. 5 P.M. 40·6°C. P. 88. R. 20.

18*th*.—The pulse, which yesterday morning was very frequent and still more so in the evening, has again fallen to 60 per minute, and the animal's condition is unchanged. Temp. A.M. 38·6°C. R. 16. The hæmatozoa are few in the blood. Temp. 1 P.M. 39·1°C. Urine, turbid, orange in colour, Sp. Gr. 1,032, alkaline, contains no albumen, but numerous Carbonate crystals. Temp. 5 P.M. 39·1°C. P. 68. R. 28.

19*th*.—The condition of the animal is unchanged. Temp. A.M. 37·4°C. P. 60. R. 16. The hæmatozoa are very numerous in the blood. Temp. 1 P.M. 39·3°C. Urine, turbid, orange in colour, Sp. Gr. 1,024, alkaline, contains no albumen, Carbonate crystals. Temp. 5 P.M. 39°C. P. 96. R. 12.

20*th*.—The animal is weak this morning and somewhat staggering in its gait, the hind quarters being at fault. The temperature is falling gradually, 38·5°C., and the pulse, which last night registered 96, is now 56; respirations 12 per minute. The appetite however remains good, and the evacuations are normal in character. The hæmatozoa are swarming in the blood. Temp. 1 P.M. 38·2°C. Urine, turbid, bright-yellow in colour, Sp. Gr. 1,018, alkaline, contains no albumen; Carbonate of Calcium crystals. Temp. 5 P.M. 38°C. P. 48. R. 28.

21*st*.—The animal is very much weaker since yesterday, and is unable to stand; it however continues to eat. Temp. A.M. 35°C. P. 36 R. 32. The hæmatozoa are swarming in the blood. Temp. 1 P.M. 35·8°C. Urine, passed but none collected. Temp. 5 P.M. 35°C. P. 56. R. 24. Death took place at 9 o'clock P.M.

AUTOPSY.—The body is fairly nourished. There is an absence of swelling and œdema from the under-surface of the abdomen and extremities.

Thorax.—There is no fluid in the pleural cavities and no pleuritic adhesions.

Lungs.—There are a few sub-pleural extravasations invading the right organ, but they are more numerous on the left. *On section* the tissues present a healthy appearance.

The cavity of the *pericardium* is devoid of fluid.

Heart—Weighs 1 lb. 3½ ozs. The *external* surface is free from extravasations of blood. *On section* the right auricle is blood-stained, but the cavities are free from sub-endocardial extravasations. The valves are healthy.

Abdominal cavity is free from fluid.

Liver—Weighs 3 lbs. 8 ozs. The convex surface is smooth, but there are numerous minute sub-capsular petechiæ, dotted over the right lobe, of a dark-purple colour. *On section*, the tissues present a well marked nutmeg condition; and are friable.

Spleen—Is large, weighs 1 lb. 13 ozs., and is dotted over with numerous sub-capsular petechiæ. *On section* the tissues are firm.

Kidneys.—The right organ weighs 9 ozs. and is found to be lying surrounded by a mass of orange-coloured (jelly-like) exudation. The capsule strips easily, and reveals the presence of numerous small dark petechiæ dotted over the surface of the cortical portion. *On section* the cortical and medullary portions appear healthy and free from petechiæ. The left weighs 7 ozs. not surrounded by exudation, but is the seat of numerous dark-coloured sub-capsular petechiæ.

Stomach.—The *cuticular* portion presents a healthy appearance. The mucous membrane of the *villous* portion is also healthy in appearance, but is the seat of a *spiroptera* tumor 1·5 inches in diameter.

Small Intestines.—At the commencement of the *duodenum* there are three small extravasations lying beneath the mucous membrane, and about midway between the pylorus and the Ileo-cæcal valve there is a portion of intestine 3·5 feet in length which presents numerous small extravasations also situated beneath the mucous membrane.

Large Intestines.—There are several small extravasations dotted about the walls of the *cæcum*, together with numerous small nematodes.

Bladder.—The mucous membrane presents a healthy appearance.

Remarks.—This animal was inoculated in order that observations might be made of the disease when transmitted to the Ass, directly from a case of naturally contracted Surra in the Horse. The animal was kept under observation for a period of eleven days; during the first five days the temperature oscillated as much as 3°C. between the morning and evening record, but this can be partially accounted for, as all animals exposed to the sun during the day register a considerably higher degree than those kept in the shade. A considerable difference will be observed on reference to the chart commencing on the 7th February, after which date the animal was kept in the stable. Inoculation was performed on the evening of the 9th February and the hæmatozoon was discovered in the blood on the morning of the 13th. The *latent* period occupied eighty-eight hours. Continued fever was present from mid-day on the 2nd to the evening of the 8th day of the disease with one short intermission on the morning of the 7th day. A fall of 3°C. occurred during the night previous to death. An abortive attempt at an intermission on the part of the hæmatozoon occurred on the 6th day. From the time of inoculation until death occurred, the period occupied was twelve days only.

RECORDS OF URINE.

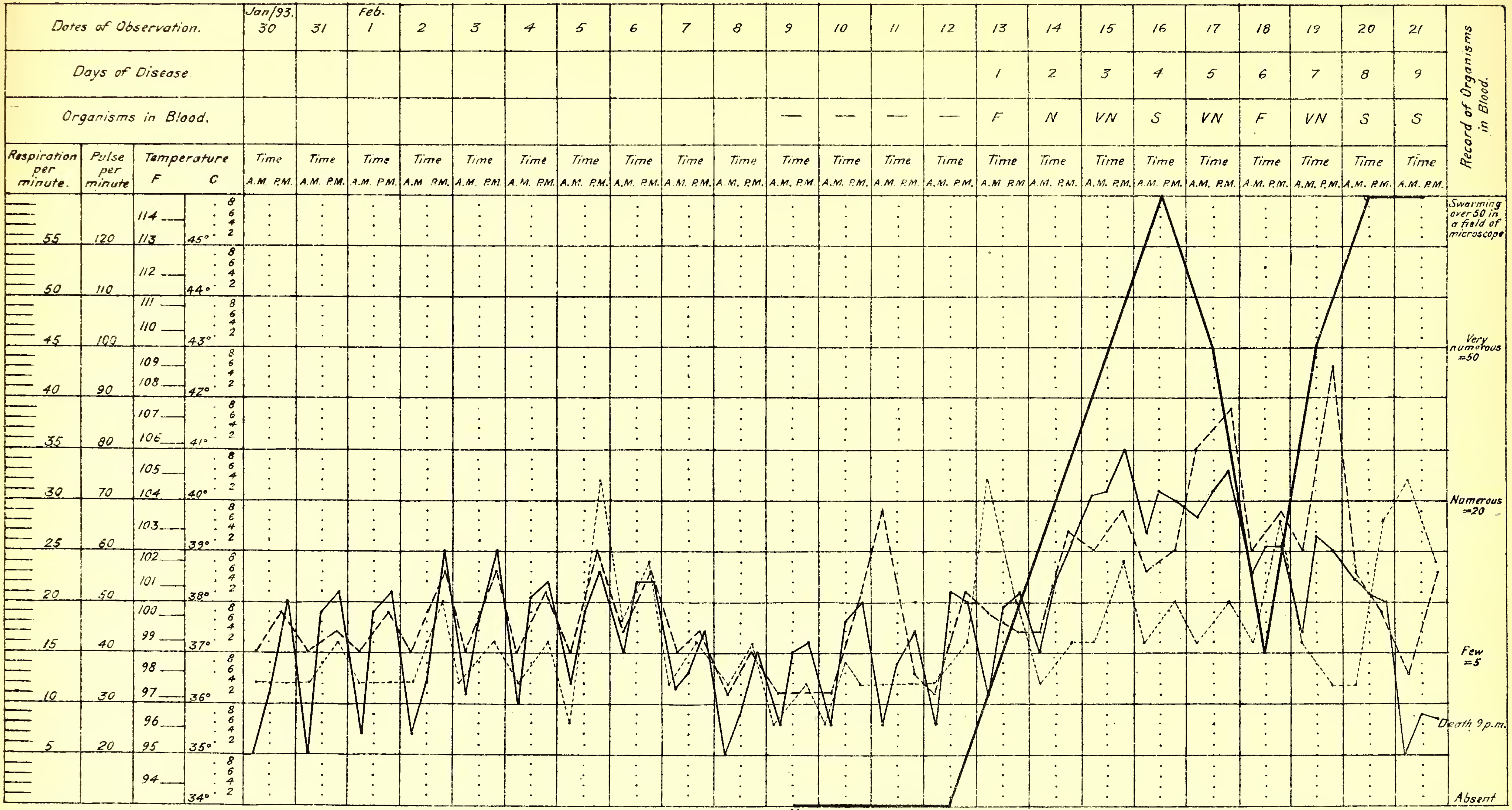
Animal, Donkey No. 1. Date of Inoculation, 9th February 1893.

Disease, Surra.

Date.	Quantity.	Colour.	Re-action.	Specific Gravity.	Albumen.	Phosphates.	REMARKS.
1893.							
January 30th...	......	Turbid, bright-yellow ...	Alkaline ...	1,040	Nil ...	Nil ...	Carbonate of Calcium crystals.
February 6th...	......	Do. do. ...	Do. ...	1,042	Nil ...	Nil ...	,, ,, ,,
,, 9th...	......	Do. do. ...	Do. ...	1,044	Nil ...	Nil ...	,, ,, ,,
,, 10th...	......	Turbid, viscid, orange...	Do. ...	1,054	Nil ...	Nil ...	,, ,, ,,
,, 11th...	......	Do. do. ...	Do. ...	1,054	Nil ...	Nil ...	,, ,, ,,
,, 12th...	......	Turbid, orange	Do. ...	1,060	Nil ...	Nil ...	,, ,, ,,
,, 13th...	......	Passed, but none collected.					
,, 14th...	......	Turbid, orange	Alkaline ...	1,038	Nil ...	Nil ...	,, ,, ,,
,, 15th...	......	Passed, but none collected.					
,, 16th...	.....	Passed, but none collected.					
,, 17th...	......	Turbid, orange	Alkaline ...	1,022	Nil ...	Nil ...	,, ,, ,,
,, 18th...	......	Do. do.	Do. ...	1,032	Nil ...	Nil ...	,, ,, ,,
,, 19th...	......	Do. do.	Do. ...	1,024	Nil ...	Nil ...	,, ,, ,,
,, 20th...	......	Turbid, bright-yellow ...	Do. ...	1,018	Nil ...	Nil ...	,, ,, ,,
,, 21st...	......	Passed, but none collected.					
,, 22nd...	......	Turbid, bright-yellow ...	Alkaline ...	1,024	Nil ...	Nil ...	Removed from the bladder *post-mortem.*

Donkey– Subcutaneously inoculated with 2·0 c.c. of blood containing numerous hæmatozoa drawn from the Jugular Vein of Horse No. LXXXIV imme-diately after death. Age, _____ Sex, _____ Colour, _____

Disease, 'Surra' inoculated _____ Date of Inoculation, 9. 2. 1893. _____ Result, Death _____ Date of Result, 21. 2. 93 _____ Register No. I _____



(S. 415)

Hæmatozoon Curve
Temperature......
Pulse.........
Respiration

Drawn & Litho: Govt Photozinco: Office, Poona 1893

X Inoculated at 5-30 p.m.

BULL.—Deccani-bred, healthy and in good condition.

Date.	Blood.	Temperature. °C.		Date.	Blood.	Temperature. °C.	
		A. M.	P. M.			A. M.	P. M.
1891.							
5th March	Healthy	...	39·2	24th May	Hæmatozoa absent.	37·5	38·7
6th ,,	,,	39·1	37·8	25th ,,	,, ,,	38·3	38·2
7th ,,	,,	37·5	37·4	26th ,,	,, ,,	37·4	38·5
8th ,,	,,	37·0	37·5	27th ,,	,, ,,	38·2	38·5
9th ,,	,,	37·1	37·6	28th ,,	,, ,,	38·2	38·6
10th ,,	,,	37·0	37·5	29th ,,	,, ,,	38.4	38·6
11th ,,	,,	37·6	37·8	30th ,,	,, ,,	37·5	38·4
12th ,,	,,	37·3	37·5	31st ,,	,, ,,	38·4	38·5
13th ,,	,,	37·3	37·5	1st June	,, ,,	38·5	38·7
14th ,,	,,	37·4	37·5	2nd ,,	,, ,,	37·2	38·4
15th ,,	,,	37·0	37·3	3rd ,,	,, ,,	38·2	38·5
16th ,,	,,	37·5	37·7	4th ,,	,, ,,	38·4	38·6
17th ,,	,,	38·0	38·4	5th ,,	,, ,,	38·0	38·3
18th ,,	,,	38·0	38·4	6th ,,	,, ,,	38·3	38·5
19th ,,	,,	38·9	38·8	7th ,,	,, ,,	37·9	38·4
20th ,,	,,	38·8	39·0	8th ,,	,, ,,	38·8	38·7
21st ,,	,,	38·2	38·4	9th ,,	,, ,,	38·3	38·9
22nd ,,	,,	38·5	38·7	10th ,,	,, ,,	38·4	38·5
23rd ,,	,,	38·2	38·5	11th ,,	,, ,,	38·4	38·7
24th* ,,	Hæmatozoa absent.	38·3	38·5	12th ,,	,, ,,	38·5	38·7
25th ,,	,, ,,	38·4	38·6	13th ,,	,, ,,	37·8	38·4
26th ,,	,, ,,	38·5	38·5	14th ,,	,, ,,	38·4	38·6
27th ,,	,, ,,	38·2	38·5	15th ,,	,, ,,	37·4	38·2
28th ,,	,, ,,	39·8	39·7	16th ,,	,, ,,	38·1	38·4
29th ,,	,, one	39·2	39·3	17th† ,,	,, ,,	38·3	38·6
30th ,,	,, absent	39·8	39·9	18th ,,	,, ,,	38·0	38·4
31st ,,	,, few	40·2	40·5	19th ,,	,, ,,	38·3	38·5
1st April	,, ,,	38·6	38·7	20th ,,	,, ,,	38·4	39·7
2nd ,,	,, absent	38·5	38·6	21st ,,	,, ,,	38·8	37·0
3rd ,,	,, ,,	39·0	39·4	22nd ,,	,, ,,	37·5	39·8
4th ,,	,, ,,	39·2	39·7	23rd ,,	,, ,,	38·1	38·4
5th ,,	,, ,,	39·1	39·5	24th ,,	,, ,,	37·3	39·5
6th ,,	,, ,,	39·3	39·6	25th ,,	,, ,,	37·3	38·1
7th ,,	,, ,,	39·4	39·0	26th ,,	,, ,,	38·8	39·4
8th ,,	,, ,,	38·6	39·7	27th ,,	,, ,,	37·4	39·5
9th ,,	,, ,,	39·4	39·8	28th ,,	,, ,,	37·4	39·1
10th ,,	,, ,,	39·5	39·6	29th ,,	,, ,,	37·7	40·0
11th ,,	,, ,,	39·6	39·8	30th ,,	,, ,,	38·0	38·0
12th ,,	,, ,,	39·5	39·7	1st July	,, ,,	36·8	38·5
13th ,,	,, ,,	39·3	39·8	2nd ,,	,, ,,	37·6	38·1
14th ,,	,, ,,	39·7	39·9	3rd ,,	,, ,,	38·5	39·6
15th ,,	,, ,,	40·0	40·3	4th ,,	,, ,,	38·4	38·1
16th ,,	,, ,,	39·4	39·7	5th ,,	,, ,,	36·8	37·5
17th ,,	,, ,,	39·4	39·7	6th ,,	,, ,,	37·4	39·1
18th ,,	,, ,,	39·3	39·5	7th ,,	,, ,,	37·5	39·5
19th ,,	,, ,,	39·4	40·6	8th ,,	,, ,,	38·2	38·4
20th ,,	,, ,,	40·4	40·8	9th ,,	,, ,,	36·7	38·3
21st ,,	,, ,,	39·4	39·8	10th ,,	,, ,,	37·3	39·4
22nd ,,	,, ,,	38·6	39·4	11th ,,	,, ,,	36·2	38·8
23rd ,,	,, ,,	39·0	39·5	12th ,,	,, ,,	37·6	39·8
24th ,,	,, ,,	39·1	39·4	13th ,,	,, ,,	37·1	38·8
25th ,,	,, ,,	39·1	39·4	14th ,,	,, ,,	37·5	39·7
26th ,,	,, ,,	38·3	38·8	15th ,,	,, ,,	37·3	38·0
27th ,,	,, ,,	38·7	39·4	16th ,,	,, ,,	36·4	38·2
28th ,,	,, ,,	39·2	39·8	17th ,,	,, ,,	36·8	38·1
29th ,,	,, ,,	39·9	39·2	18th ,,	,, ,,	37·3	38·2
30th ,,	,, ,,	39·2	39·5	19th ,,	,, ,,	37·4	37·6
1st May	,, ,,	39·2	39·6	20th ,,	,, ,,	37·6	37·7
2nd ,,	,, ,,	39·3	39·6	21st ,,	,, ,,	38·8	39·8
3rd ,,	,, ,,	39·2	39·6	22nd ,,	,, ,,	38·3	38·6
4th ,,	,, ,,	39·2	39·6	23rd ,,	,, ,,	37·7	38·4
5th ,,	,, ,,	39·5	39·6	24th ,,	,, ,,	37·8	38·1
6th ,,	,, ,,	39·6	39·8	25th ,,	,, ,,	37·3	37·5
7th ,,	,, ,,	38·8	39·6	26th ,,	,, ,,	37·2	38·4
8th ,,	,, ,,	39·2	39·5	27th ,,	,, ,,	38·8	38·7
9th ,,	,, ,,	39·2	39·9	28th ,,	,, ,,	38·4	38·6
10th ,,	,, ,,	39·6	39·4	29th ,,	,, ,,	37·6	38·1
11th ,,	,, ,,	39·1	39·6	30th ,,	,, ,,	37·4	38·2
12th ,,	,, ,,	39·3	39·7	31st ,,	,, ,,	37·8	38·1
13th ,,	,, ,,	39·5	39·2	1st August	,, ,,	37·5	38·0
14th ,,	,, ,,	38·4	39·5	2nd ,,	,, ,,	37·7	38·7
15th ,,	,, ,,	39·1	39·4	3rd ,,	,, ,,	38·2	38·8
16th ,,	,, ,,	39·1	39·5	4th ,,	,, ,,	38·3	39·1
17th ,,	,, ,,	39·2	38·8	5th ,,	,, ,,	37·6	38·6
18th ,,	,, ,,	38·4	39·3	6th ,,	,, ,,	38·3	38·7
19th ,,	,, ,,	39·1	39·5	7th ,,	,, ,,	38·2	38·4
20th ,,	,, ,,	39·6	39·7	8th ,,	,, ,,	37·7	38·7
21st ,,	,, ,,	39·5	38·5	9th ,,	,, ,,	38·7	39·8
22nd ,,	,, ,,	37·8	38·6	10th ,,	,, ,,	38·6	38·0
23rd ,,	,, ,,	38·2	38·3	11th ,,	,, ,,	38·0	38·6

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*March 24th, 1891.—This animal was subcutaneously inoculated with 1·75 c.c.—containing numerous hæmatozoa taken from the Internal Jugular Vein of Horse No. XIX.

†*June 17th, 1891.*—Two Guinea-pigs Nos. i and ii were subcutaneously inoculated with 0·2 c.c. of blood from which apparently ne hæmatozoon was absent, taken from the Bull with strict antiseptic precautions.

Date.	Blood.	Temperature. °C	
		A.M.	P.M.
1891.			
12th August	Hæmatozoa absent	37·3	38·2
13th ,,	,,	37·5	38·1
14th ,,	,,	37·6	38·6
15th ,,	,,	39·2	39·0
16th ,,	,,	38·4	39·0
17th ,,	,,	38·6	38·6
18th ,,	,,	38·0	38·8
19th ,,	,,	38·6	38·5
20th ,,	,,	38·1	38·0
21st ,,	,,	37·5	38·2
22nd ,,	,,	37·5	38·0
23rd ,,	,,	37·5	38·5
24th ,,	,,	38·6	39·1
25th ,,	,,	39·0	39·1
26th ,,	,,	38·5	39·2
27th ,,	,,	38·5	39·1
28th ,,	,,	38·6	38·1
29th ,,	,,	37·5	38·5
30th ,,	,,	38·1	38·7
31st ,,	,,	38·1	38·3
1st September	,,	37·7	39·1
2nd ,,	,,	38·0	39·0
3rd* ,,	,,	39·2	39·1
4th ,,	,,	39·8	38·6
5th ,,	,,	38·2	39·0
6th ,,	,,	38·4	38·8
7th ,,	,,	38·6	38·7
8th ,,	,,	38·3	38·6
9th ,,	,,	38·4	38·0
10th ,,	,,	37·5	38·1
11th ,,	,,	37·5	38·0
12th ,,	,,	37·3	38·1
13th ,,	,,	37·4	38·2
14th ,,	,,	37·1	38·1
15th ,,	,,	37·5	39·3
16th ,,	,,	37·1	38·0
17th ,,	,,	37·1	38·1
18th ,,	,,	38·2	40·0
19th ,,	,,	37·8	38·5
20th ,,	,,	39·4	38·4
21st ,,	,,	38·3	39·2
22nd ,,	,,	37·3	38·7
23rd ,,	,,	37·0	38·5
24th ,,	,,	37·6	38·6
25th ,,	,,	37·7	38·5
26th ,,	,,	37·7	38·6
27th ,,	,,	37·2	38·2
28th ,,	,,	37·2	38·5
29th ,,	,,	37·3	38·4
30th ,,	,,	36·8	38·1
1st October	,,	36·7	37·6
2nd ,,	,,	36·4	38·6
3rd ,,	,,	37·6	38·2
4th ,,	,,	38·0	38·1
5th ,,	,,	37·6	38·7
6th ,,	,,	37·7	39·1
7th ,,	,,	37·8	38·8
8th ,,	,,	37·8	38·7
9th ,,	,,	37·8	38·6
10th ,,	,,	38·0	38·4
11th ,,	,,	37·7	38·4
12th ,,	,,	37·8	38·5
13th ,,	,,	36·7	38·4
14th ,,	,,	36·8	38·1
15th ,,	,,	37·6	40·0
16th ,,	,,	37·8	40·1
17th ,,	,,	38·5	40·2
18th ,,	,,	37·2	38·2
19th ,,	,,	37·0	38·3
20th ,,	,,	36·6	37·3
21st ,,	,,	36·2	38·4
22nd ,,	,,	37·1	38·5
23rd ,,	,,	38·1	38·4
24th ,,	,,	37·1	39·0
25th ,,	,,	37·5	38·4
26th ,,	,,	37·7	39·2
27th ,,	,,	37·2	39·1
28th ,,	,,	37·7	39·0
29th ,,	,,	38·2	39·3
30th ,,	,,	38·2	39·2
31st ,,	,,	38·3	39·4
1st November	,,	37·4	39·2
2nd ,,	,,	37·2	39·1
3rd ,,	,,	37·3	39·0
4th November	Hæmatozoa absent.	38·8	39·1
5th ,,	,,	39·4	40·0
6th ,,	,,	38·3	40·1
7th ,,	,,	39·2	39·7
8th ,,	,,	38·7	39·5
9th ,,	,,	37·2	39·2
10th ,,	,,	37·0	39·6
11th ,,	,,	37·2	39·0
12th ,,	,,	36·3	38·6
13th† ,,	,,	36·8	36·6
14th ,,	,,	36·7	39·6
15th ,,	,,	36·6	39·0
16th ,,	,,	36·5	38·6
17th ,,	,,	36·8	38·5
18th ,,	,,	36·5	38·6
19th ,,	,,	36·2	38·0
20th ,,	,,	35·6	38·3
21st ,,	,,	36·1	38·2
22nd ,,	,,	36·7	37·5
23rd ,,	,,	36·3	37·8
24th ,,	,,	36·3	37·8
25th ,,	,,	36·1	38·0
26th ,,	,,	36·1	38·1
27th ,,	,,	36·1	38·3
28th ,,	,,	36·0	38·3
29th ,,	,,	36·7	38·1
30th ,,	,,	36·4	38·0
1st December	,,	36·3	37·8
2nd ,,	,,	35·8	38·1
3rd ,,	,,	35·8	38·1
4th ,,	,,	36·6	38·5
5th ,,	,,	36·2	38·4
6th ,,	,,	36·2	38·2
7th ,,	,,	36·3	37·8
8th ,,	,,	36·3	38·3
9th ,,	,,	36·0	37·8
10th ,,	,,	36·4	37·7
11th ,,	,,	36·4	37·8
12th ,,	,,	36·0	38·0
13th ,,	,,	36·6	37·8
14th ,,	,,	36·4	37·8
15th ,,	,,	36·4	38·6
16th‡ ,,	,,	35·6	38·5
17th ,,	,,	36·2	38·2
18th ,,	,,	35·7	38·4
19th ,,	,,	36·5	38·4
20th ,,	,,	36·6	38·7
21st ,,	,,	37·4	39·3
22nd ,,	,,	37·3	39·1
23rd ,,	,,	37·5	39·2
24th ,,	,,	36·2	39·3
25th ,,	,,	36·4	39·2
26th ,,	,,	35·6	39·3
27th ,,	,,	36·1	39·2
28th ,,	,,	35·8	38·7
29th ,,	,,	35·5	38·4
30th ,,	,,	35·6	38·5
31st ,,	,,	35·7	38·6
1st January 1892.	,,	36·2	38·7
2nd ,,	,,	36·4	38·4
3rd ,,	,,	36·4	38·2
4th ,,	,,	36·6	38·1
5th ,,	,,	36·4	38·5
6th ,,	,,	37·4	39·3
7th ,,	,,	37·4	39·4
8th ,,	,,	36·4	39·3
9th ,,	,,	36·3	39·1
10th ,,	,,	37·7	39·2
11th ,,	,,	37·1	39·2
12th ,,	,,	37·6	39·1
13th ,,	,,	37·5	39·2
14th ,,	,,	38·0	39·3
15th ,,	,,	37·6	39·3
16th ,,	,,	37·4	39·5
17th ,,	,,	37·7	39·3
18th ,,	,,	38·1	39·4
19th ,,	,,	37·8	39·5
20th ,,	,,	37·1	39·4
21st ,,	,,	37·0	39·3
22nd ,,	,,	37·4	38·8
23rd ,,	,,	37·4	39·4
24th ,,	,,	37·4	40·6
25th ,,	,,	40·3	40·5
26th ,,	,,	40·4	40·4

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* *September 3rd, 1891.*—Inoculated subcutaneously two Guinea-pigs, Nos. III and IV, with 0·2 c.c. of blood, from which apparently the hæmatozoon was absent, taken from the Bull with the same precautions as in the previous experiments.

† *November 13th, 1891.*—Inoculated subcutaneously two Guinea-pigs, Nos. V and VI, with 0·2 c.c. of blood, apparently containing no hæmatozoa, taken from the Bull with the same precautions as previously mentioned.

‡ *December 16th, 1891.*—Re-inoculated Guinea-pigs, Nos. V and VI with 0·2 c.c. of blood taken from the Bull.

Date.	Blood.	Temperature. °C.		Date.	Blood.	Temperature. °C.	
		A. M.	P. M.			A. M.	P. M.
1892.							
27th January ...	Hæmatozoa absent .	40·3	39·4	21st April ...	Hæmatozoa absent .	37·7	39·6
28th ,, ...	,, ,, ...	37·3	39·4	22nd ,, ...	,, ,, ...	38·1	39·4
29th ,, ...	,, ,, ...	37·8	39·5	23rd ,, ...	,, ,, ...	38·3	40·2
30th ,, ...	,, ,, ...	37·2	39·4	24th ,, ...	,, ,, ...	38·1	39·4
31st ,, ...	,, ,, ...	36·8	38·6	25th ,, ...	,, ,, ...	38·5	39·3
1st February...	,, ,, ...	37·5	39·4	26th ,, ...	,, ,, ...	38·1	39·4
2nd ,, ...	,, ,, ...	37·	39·2	27th ,, ...	,, ,, ...	38·1	39·6
3rd ,, ...	,, ,, ...	37·4	39·5	28th ,, ...	,, ,, ...	38·1	40·
4th ,, ...	,, ,, ...	36·4	39·6	29th ,, ...	,, ,, ...	38·1	39·7
5th ,, ...	,, ,, ...	37·4	39·6	30th ,, ...	,, ,, ...	37·7	39·4
6th ,, ...	,, ,, ...	37·2	39·6	1st May ...	,, ,, ...	38·1	39·5
7th ,, ...	,, ,, ...	38·2	39·2	2nd ,, ...	,, ,, ...	38·1	39·2
8th ,, ...	,, ,, ...	37·	39·3	3rd ,, ...	,, ,, ...	38·1	40·
9th ,, ...	,, ,, ...	36·7	39·3	4th ,, ...	,, ,, ...	38·1	39·3
10th ,, ...	,, ,, ...	37·5	39·5	5th ,, ...	,, ,, ...	38·1	39·4
11th ,, ...	,, ,, ...	36·4	37·6	6th ,, ...	,, ,, ...	38·5	39·4
12th ,, ...	,, ,, ...	36·4	38·5	7th ,, ...	,, ,, ...	37·7	39·7
13th ,, ...	,, ,, ...	36·2	39·5	8th ,, ...	,, ,, ...	38·1	39·6
14th ,, ...	,, ,, ...	37·2	39·4	9th ,, ...	,, ,, .	38·1	39·4
15th ,, ...	,, ,, ...	37·	40·	10th ,, ...	,, ,, ...	37·5	39·5
16th ,, ...	,, ,, ...	37·2	40·2	11th ,, ...	,, ,, ...	38·1	39·7
17th ,, ...	,, ,, ...	37·	40·3	12th ,, ...	,, ,, ...	36·7	39·4
18th ,, ...	,, ,, ...	37·2	40·	13th ,, ...	,, ,, ...	38·1	39·4
19th ,, ...	,, ,, ...	37·6	39·3	14th ,, ...	,, ,, ...	38·5	39·5
20th ,, ...	,, ,, ...	36·3	40·	15th ,, ...	,, ,, ...	38·3	39·3
21st ,, ...	,, ,, ...	36·7	39·4	16th ,, ...	,, ,, ...	38·1	39·2
22nd ,, ...	,, ,, ...	35·8	39·7	17th ,, ...	,, ,, ...	37·6	39·6
23rd ,, ...	,, ,, ...	37·	39·5	18th ,, ...	,, ,, ...	38·5	40·2
24th ,, ...	,, ,, ...	36·1	39·3	19th ,, ...	,, ,, ...	37·6	39·8
25th ,, ...	,, ,, ...	36·4	39·4	20th ,, ...	,, ,, ...	38·1	39·5
26th ,, ...	,, ,, ...	36·4	39·4	21st ,, ...	,, ,, ...	38·8	39·7
27th ,, ...	,, ,, ...	36·7	39·7	22nd ,, ...	,, ,, ...	38·1	39·2
28th ,, ...	,, ,, ...	36·1	39·4	23rd ,, ...	,, ,, ...	37·4	39·4
29th ,, ...	,, ,, ...	36·7	39·6	24th ,, ...	,, ,, ...	38·	39·4
1st March ...	,, ,, ...	36·8	40·	25th ,, ...	,, ,, ...	38·	40·3
2nd ,, ...	,, ,, ...	37·2	39·4	26th ,, ...	,, ,, ...	37·7	39·5
3rd* ,, ...	,, ,, ...	36·1	39·1	27th ,, ...	,, ,, ...	37·7	39·6
4th ,, ...	,, ,, ...	36·4	40·1	28th ,, ...	,, ,, ...	38·1	39·4
5th ,, ...	,, ,, ..	37·	40·	29th ,, ...	,, ,, ..	38·	39·6
6th ,, ...	,, ,, ...	36·1	39·6	30th ,, ...	,, ,, ...	38·1	38·1
7th ,, ...	,, ,, ...	36·1	39·8	31st ,, ...	,, ,, ...	38·1	39·4
8th ,, ...	,, ,, ...	36·7	39·3	1st June ...	,, ,, ...	38·	39·6
9th ,, ...	,, ,, ...	35·7	39·3	2nd ,, ...	,, ,, ..	38·	39·4
10th ,, ...	,, ,, ...	35·7	39·4	3rd ,, ...	,, ,, ...	37·7	39·2
11th ,, ...	,, ,, ...	36·3	39·6	4th ,, ...	,, ,, ...	38·	39·
12th ,, ...	,, ,, ...	36·3	39·3	5th ,, ...	,, ,, ...	38·1	39·5
13th ,, ...	,, ,, ...	36·3	39·2	6th ,, ...	,, ,, ..	38·6	38·8
14th ,, ...	,, ,, ...	37·7	39·4	7th ,, ...	,, ,, ...	38·8	38·1
15th ,, ...	,, ,, ...	38·3	39·5	8th ,, ...	,, ,, ...	38·1	39·
16th ,, ...	,, ,, ...	38·6	39·3	9th ,, ...	,, ,, ...	37·4	38·5
17th ,, ...	,, ,, ...	37·7	39·4	10th ,, ..	,, ,, ...	37·6	38·3
18th ,, ...	,, ,, ...	37·4	39·4	11th ,, ...	,, ,, ...	37·6	39·4
19th ,, ...	,, ,, ...	37·2	39·3	12th ,, ...	,, ,, ...	38·4	39·4
20th ,, ...	,, ,, ...	37·7	39·6	13th ,, ...	,, ,, ...	37·8	39·3
21st ,, ...	,, ,, ...	37·7	39·6	14th ,, ...	,, ,, ...	37·6	39·2
22nd ,, ...	,, ,, ...	36·4	39·4	15th ,, ...	,, ,, ...	39·4	39·8
23rd ,, ...	,, ,, ...	37·6	39·3	16th ,, ...	,, ,, ...	39·4	39·5
24th ,, ...	,, ,, ...	37·7	39·2	17th ,, ...	,, ,, ...	39·4	39·6
25th ,, ...	,, ,, ...	37·6	39·4	18th ,, ...	,, ,, ...	39·7	39·4
26th ,, ...	,, ,, ...	37·8	39·8	19th ,, ...	,, ,, ...	39·5	40·
27th ,, ...	,, ,, ...	37·3	39·6	20th ,, ...	,, ,, ...	39·3	40·1
28th ,, ...	,, ,, ...	36·4	39·6	21st ,, ...	,, ,, ...	39·	39·4
29th ,, ...	,, ,, ..	36·7	39·4	22nd ,, ...	,, ,, ...	39·1	39·2
30th ,, ...	,, ,, ...	38·3	39·5	23rd ,, ...	,, ,, ...	39·2	38·
31st ,, ...	,, ,, ...	38·3	39·4	24th ,, ...	,, ,, ...	39·4	39·7
1st April ...	,, ,, ...	39·	39·5	25th ,, ...	,, ,, ...	39·3	39·6
2nd ,, ...	,, ,, ...	38·6	39·5	26th ,, ...	,, ,, ...	39·4	40·
3rd ,, ...	,, ,, ...	39·	39·5	27th ,, ...	,, ,, ...	39·5	40·
4th ,, ...	,, ,, ...	39·1	39·4	28th ,, ...	,, ,, ...	39·4	39·6
5th ,, ...	,, ,, ...	38·2	40·	29th ,, ...	,, ,, ...	39·3	40·
6th ,, ...	,, ,, ...	38·1	39·7	30th ,, ...	,, ,, ..	39·3	39·6
7th ,, ...	,, ,, ...	39·2	39·7	1st July ...	,, ,, ...	39·5	39·4
8th ,, ...	,, ,, ...	38·8	39·4	2nd ,, ...	,, ,, ...	39·4	39·5
9th ,, ...	,, ,, ...	38·1	39·5	3rd ,, ...	,, ,, ...	39·3	39·7
10th ,, ...	,, ,, ...	38·8	39·4	4th ,, ...	,, ,, ...	39·4	39·6
11th ,, ...	,, ,, ...	38·6	39·4	5th ,, ...	,, ,, ...	39·4	39·8
12th ,, ...	,, ,, ...	38·5	39·3	6th ,, ...	,, ,, ...	39·3	39·6
13th ,, ...	,, ,, ...	39·	39·7	7th ,, ...	,, ,, ...	39·3	39·5
14th ,, ...	,, ,, ...	38·6	39·5	8th ,, ...	,, ,, ...	39·4	39·2
15th ,, ..	,, ,, ...	39·7	40·	9th ,, ...	,, ,, ...	39·1	39·2
16th ,, ...	,, ,, ...	39·2	39·2	10th ,, ...	,, ,, ...	39·	39·2
17th ,, ...	,, ,, ...	38·1	39·4	11th ,, ...	,, ,, ...	38·6	37·6
18th ,, ...	,, ,, ...	37·7	39·1	12th ,, ...	,, ,, ...	38·	39·3
19th ,, ...	,, ,, ...	37·8	39·4	13th ,, ...	,, ,, ...	37·6	37·6
20th ,, ...	,, ,, ...	37·6	39·4	14th ,, ...	,, ,, ...	38·	39·1

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*_March 14th, 1892._—Inoculated subcutaneously two Guinea-pigs Nos. VII and VIII with 0·2 c c. of blood from which the hæmatozoon was apparently absent, with the same precautions as before.

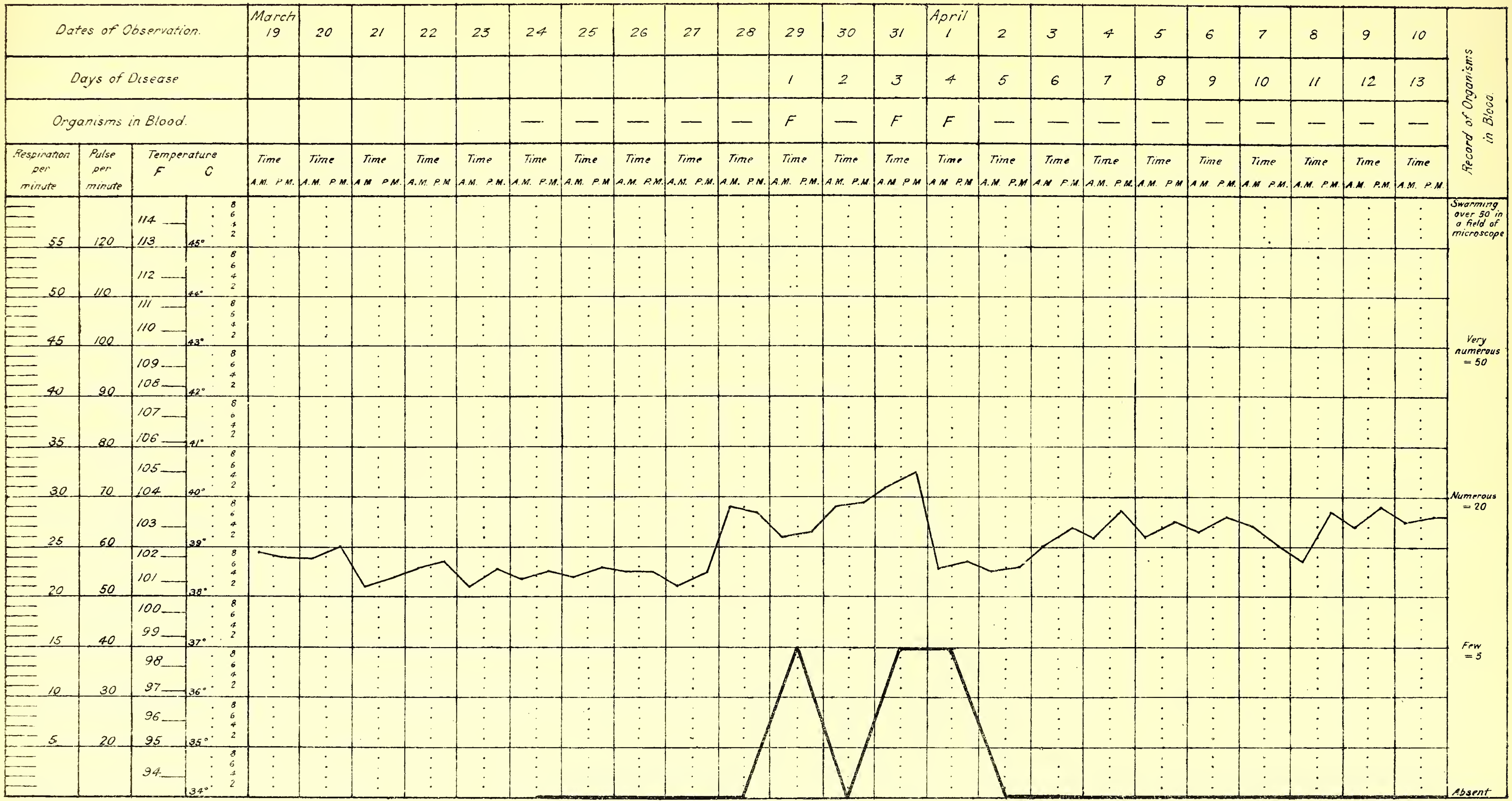
Month and date.	Blood.	Temperature. °C.		
		A.M.		P.M.
15th July ...	Hæmatozoa absent.	38·		38·7
16th ,, ...	,, ,, ...	38·6		39·2
17th ,, ...	,, ,, ...	38·		38·5
18th ,, ...	,, ,, ...	38·		39·3
19th ,, ...	,, ,, ...	37·6		39·
20th ,, ...	,, ,, ...	38·		39·3
21st ,, ...	,, ,, ...	38·3		39·4
22nd ,, ...	,, ,, ...	38·3		40·
23rd ,, ...	,, ,, ...	39·4		40·3
24th ,, ...	,, ,, ...	39·2		40·
25th ,, ...	,, ,, ..	39·3		39·3
26th ,, ...	,, ,, ...	39·3		40·
27th ,, ...	,, ,, ...	39·3		39·5
28th ,, ...	,, ,, ...	39·2		40·4
29th ,, ...	,, ,, ...	39·2		39·7
30th ,, ...	,, ,, ...	39·4		40·
31st ,, ...	,, ,, ...	39·1		39·3
1st August ...	,, ,, ...	37·		39·2
2nd ,, ...	,, ,, ...	39·		39·6
3rd ,, ...	,, ,, ...	39·		40·4
4th ,, ...	,, ,, ..	39·1		40·
5th ,, ...	,, ,, ...	38·8		39·3
6th ,, ...	,, ,, ...	39·1		39·3
7th ,, ...	,, ,, ..	38·6		39·5
8th ,, ...	,, ,, ...	38·		39·3
9th ,, ...	,, ,, ...	38·5		39·3
10th ,, ...	,, ,, ...	39·3		39·6
11th ,, ...	,, ,, ...	39·2		39·4
12th ,, ...	,, ,, ...	39·1		40·2
13th ,, ...	,, ,, ...	39·3		39·6
14th ,, ...	,, ,, ...	39·2		39·7
15th ,, ...	,, ,, ...	39·3		40·
16th ,, ...	,, ,, ...	39·3		39·3
17th ,, ...	,, ,, ...	39·2		40·
18th ,, ...	,, ,, ...	39·6		40·1
19th ,, ...	,, ,, ...	39·3		40·
20th ,, ...	,, ,, ...	39·3		40·3
21st ,, ...	,, ,, ...	39·1		40·
		A.M.	Noon.	P.M.
22nd August ...	,, ,, ...	38·	39·3	39·7
23rd ,, ...	,, ,, ...	39·1	39·3	39·3
24th ,, ...	,, ,, ...	38·5	39·3	40·2
25th ,, ...	,, ,, ...	39·3	39·3	40·
26th ,, ...	,, ,, ...	39·2	39·6	39·7
27th ,, ...	,, ,, ...	39·3	39·3	39·5
28th ,, ...	,, ,, ...	39·5	39·3	39·3
29th ,, ...	,, ,, ...	39·3	39·7	40·
30th ,, ...	,, ,, ...	39·3	40·8	41·

Month and date.	Blood.	Temperature. °C.		
		A.M.	Noon.	P.M.
31st August ...	Hæmatozoa absent..	39·8	40·	40·8
1st September..	,, ,, ..	39·3	40·3	40·9
2nd ,, ...	,, ,, ...	38·3	39·3	39·3
3rd ,, ...	,, ,, ...	38·	39·	39·5
4th ,, ...	,, ,, ...	38·3	38·8	39·2
5th ,, —	,, ,, ...	38·6	38·6	39·
6th ,, ...	,, ,, ...	38·5	39·2	39·3
7th ,, ...	,, ,, ...	38·	39·8	40·1
8th ,, ...	,, ,, ...	38·8	40·	40·
9th ,, ...	,, ,, ...	39·2	40·1	41·3
10th ,, ...	,, ,, ...	39·3	39·7	39·8
11th ,, ...	,, ,, ...	38·7	41·	39·3
12th ,, ...	,, ,, ...	40·1	40·5	40·2
13th ,, ...	,, ,, ...	39·3	39·8	40·
14th ,, ...	,, ,, ...	37·6	39·3	40·1
15th ,, ...	,, ,, ...	39·2	39·3	39·7
16th ,, ...	,, ,, ...	39·1	39·7	39·3
17th ,, ...	,, ,, ...	39·	39·3	39·3
18th ,, ...	,, ,, ...	38·8	39·3	39·7
19th ,, ...	,, ,, ...	39·3	39·3	40·
20th ,, ...	,, ,, ...	39·1	40·	39·3
21st ,, ...	,, ,, ...	39·	39·8	39·8
22nd ,, ...	,, ,, ...	39·3	39·3	39·3
23rd ,, ...	,, ,, ...	39·2	39·3	39·6
24th ,, ...	,, ,, ...	38·6	39·3	39·3
25th ,, ...	,, ,, ...	38·6	39·3	39·3
26th ,, ...	,, ,, ...	38·8	39·3	39·3
27th ,, ...	,, ,, ...	38·6	39·3	39·3
28th ,, ...	,, ,, ...	38·6	39·3	39·3
29th ,, ...	,, ,, ...	38·6	39·3	39·3
30th ,, ...	,, ,, ...	38·8	39·1	40·
1st October ...	,, ,, ...	38·6	39·3	39·1
2nd ,, ...	,, ,, ...	39·	39·3	39·3
3rd ,, ...	,, ,, ...	38·	39·3	39·3
4th ,, ...	,, ,, ...	38·6	39·3	39·7
5th ,, ...	,, ,, ...	39·1	39·2	39·3
6th ,, ...	,, ,, ...	39·	39·3	40·6
7th ,, ...	,, ,, ...	39·3	39·2	39·4
8th ,, ...	,, ,, ...	38·4	39·	39·2
9th ,, ...	,, ,, ...	38·3	38·8	39·1
10th ,, ...	,, ,, ...	38·5	38·7	39·2
11th ,, ...	,, ,, ...	38·4	38·5	38·8
12th ,, ...	,, ,, ...	38·4	38·6	39·1
13th ,, ...	,, ,, ...	38·5	38·5	38·6
14th ,, ...	,, ,, ...	38·4	38·7	38·6
15th ,, ...	,, ,, ...	38·2	38·6	39·
16th ,, ...	,, ,, ...	38·4	38·7	39·1
17th ,, ...	,, ,, ...	38·4	38·6	39·1
18th ,, ...	,, ,, ...	38·1	38·6	39·1
19th ,, ...	,, ,, ...	38·6	38·6	39·
20th ,, ...	,, ,, ...	38·1	38·4	38·8
21st ,, ...	,, ,, ...	38·2	38·3	38·8

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Bull. inoculated Subcutaneously with 1·75 cc of blood from Horse Nº XIX. Age Sex Colour

Disease Surra' Date of Inoculation, 24 March 91 Result Date of Result Register No. 1



Dates of Observation.	March 19	20	21	22	23	24	25	26	27	28	29	30	31	April 1	2	3	4	5	6	7	8	9	10
Days of Disease											1	2	3	4	5	6	7	8	9	10	11	12	13
Organisms in Blood.						—	—	—	—	—	F	—	F	F	—	—	—	—	—	—	—	—	—

(S. 415)

Hæmatozoon curve
Temperature

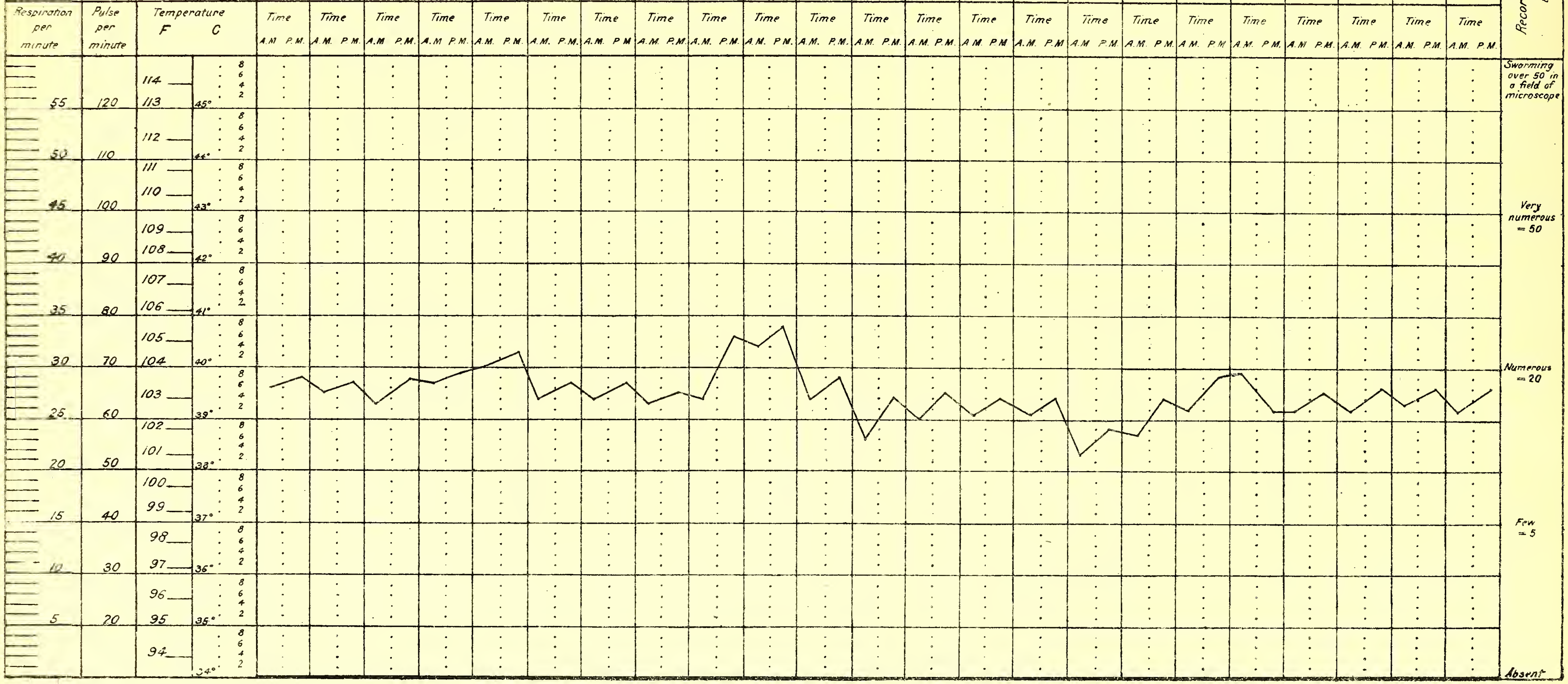
Drawn & Litho: Govt Photozinco: Office Poona 1892.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Bull. Age Sex Colour

Disease Date of Result Date of Result Register No. I.

Dates of Observation.	April 11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	May 1	2	3
Days of Disease	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Organisms in Blood	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—



(S 415)

Hæmatozoon curve
Temperature ......

Drawn & Litho: Govt. Photozinco: Office Poona 1892.

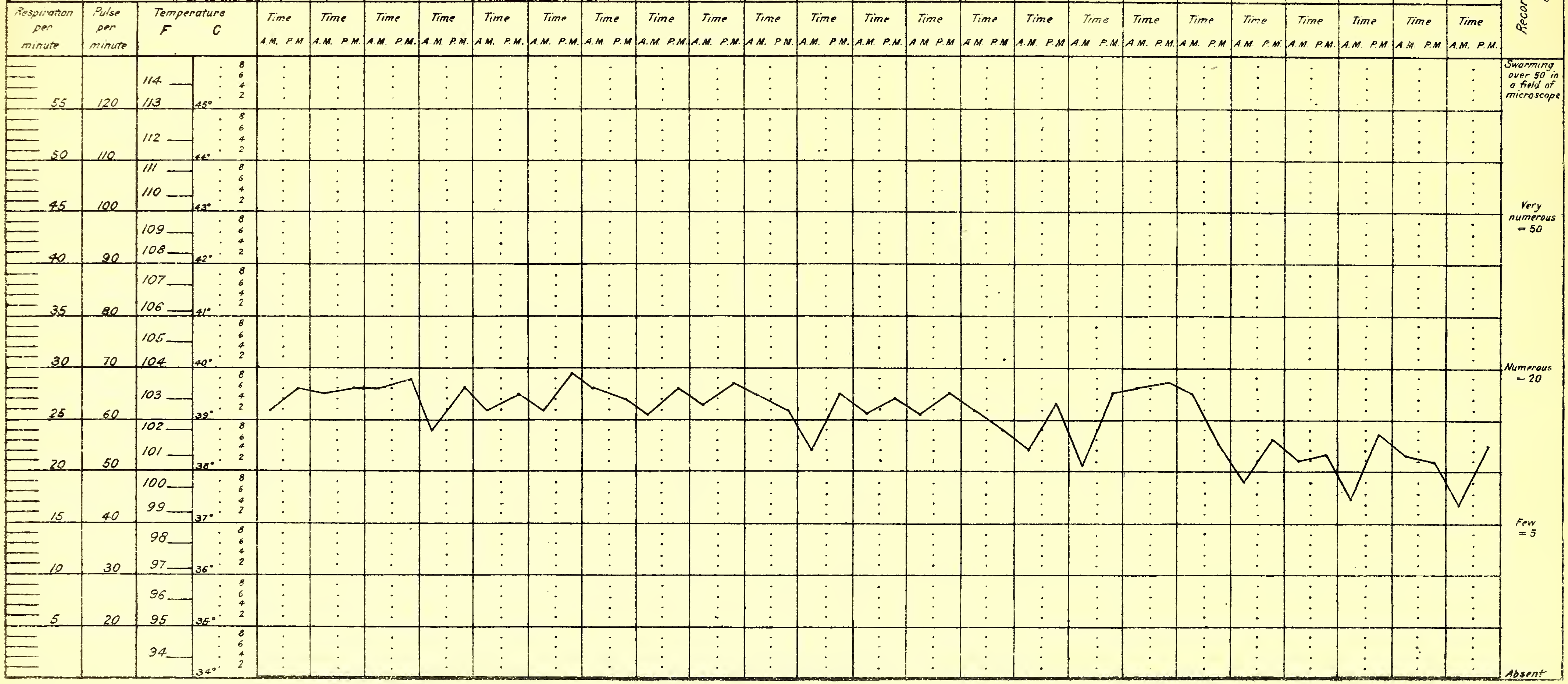
RECORD OF TEMPERATURE, PULSE AND RESPIRATION.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Bull. ____ Age ____ Sex ____ Colour ____

Disease ____ Date of ____ Result ____ Date of Result ____ Register No. I. ____

Dates of Observation.	May 4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Days of Disease	37	38	39	40	41	4	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59
Organisms in Blood	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—



(S 415)

Hæmatozoon curve
Temperature ......

Drawn & Litho: Govt Photozinco: Office Poona 1892.

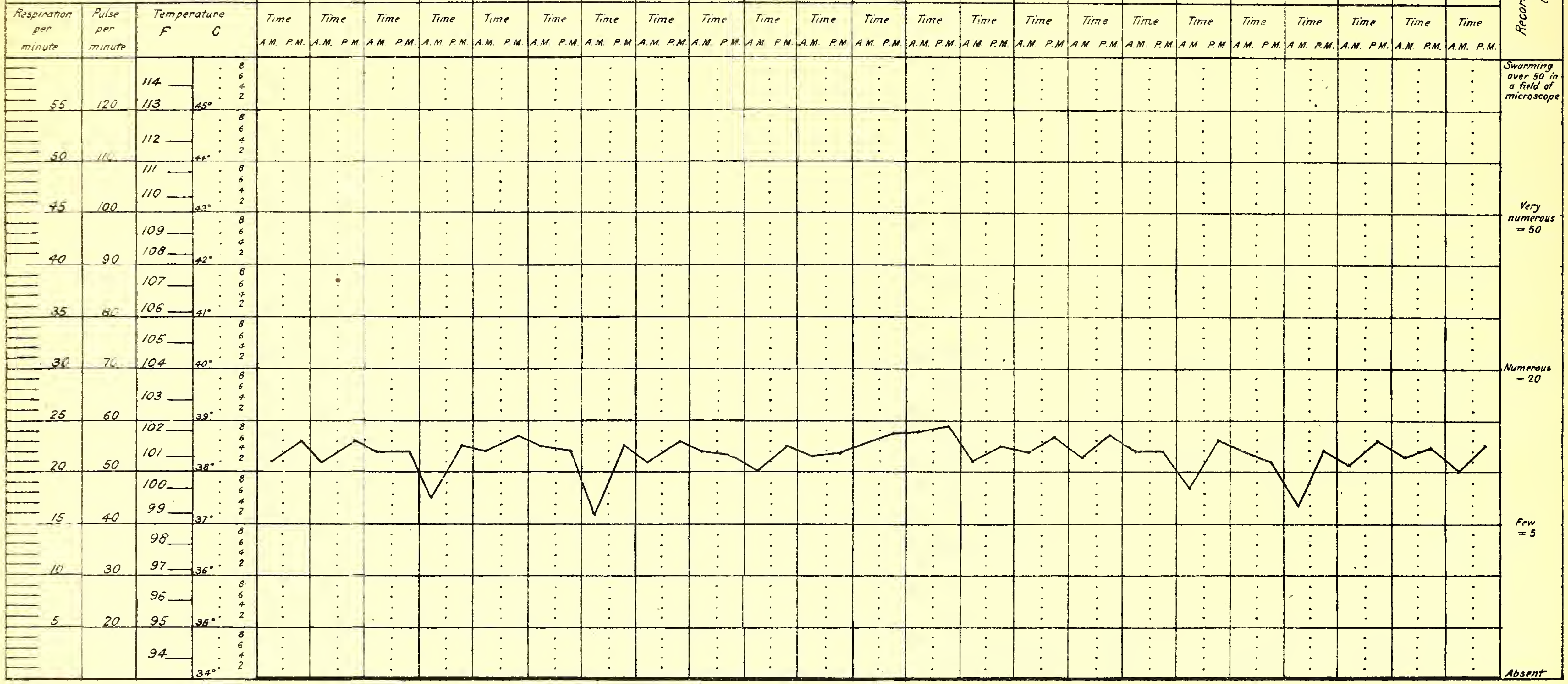
RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Bull. ______ Age ______ Sex ______ Colour ______

Disease ______ Date of ______ Result ______ Date of Result ______ Register No. I. ______

Dates of Observation.	May 27	28	29	30	31	June 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Record of Organisms in Blood.
Days of Disease	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	
Organisms in Blood.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	



(S. 415)

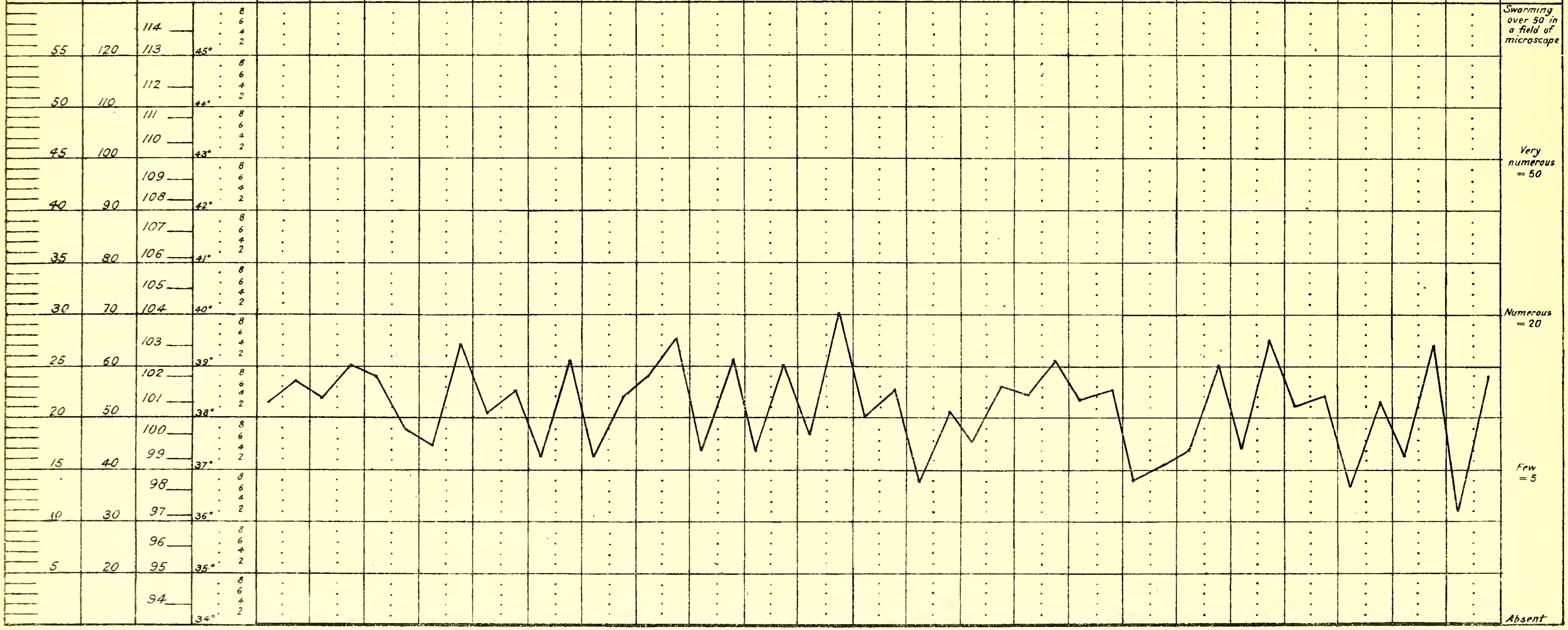
Hæmatozoan curve ——
Temperature ......

Drawn & Litho. Govt Photozinco. Office Poona 1892.

Bull. ______ Age ______ Sex ______ Colour ______

Disease ______ Date of ______ Result ______ Date of Result ______ Register No. I.

Dates of Observation.	June 19	20	21	22	23	24	25	26	27	28	29	30	July 1	2	3	4	5	6	7	8	9	10	11	Record of Organisms in Blood.
Days of Disease	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	
Organisms in Blood.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Respiration per minute Pulse per minute Temperature F C	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	



(S 415)

Hæmatozoon curve
Temperature .....

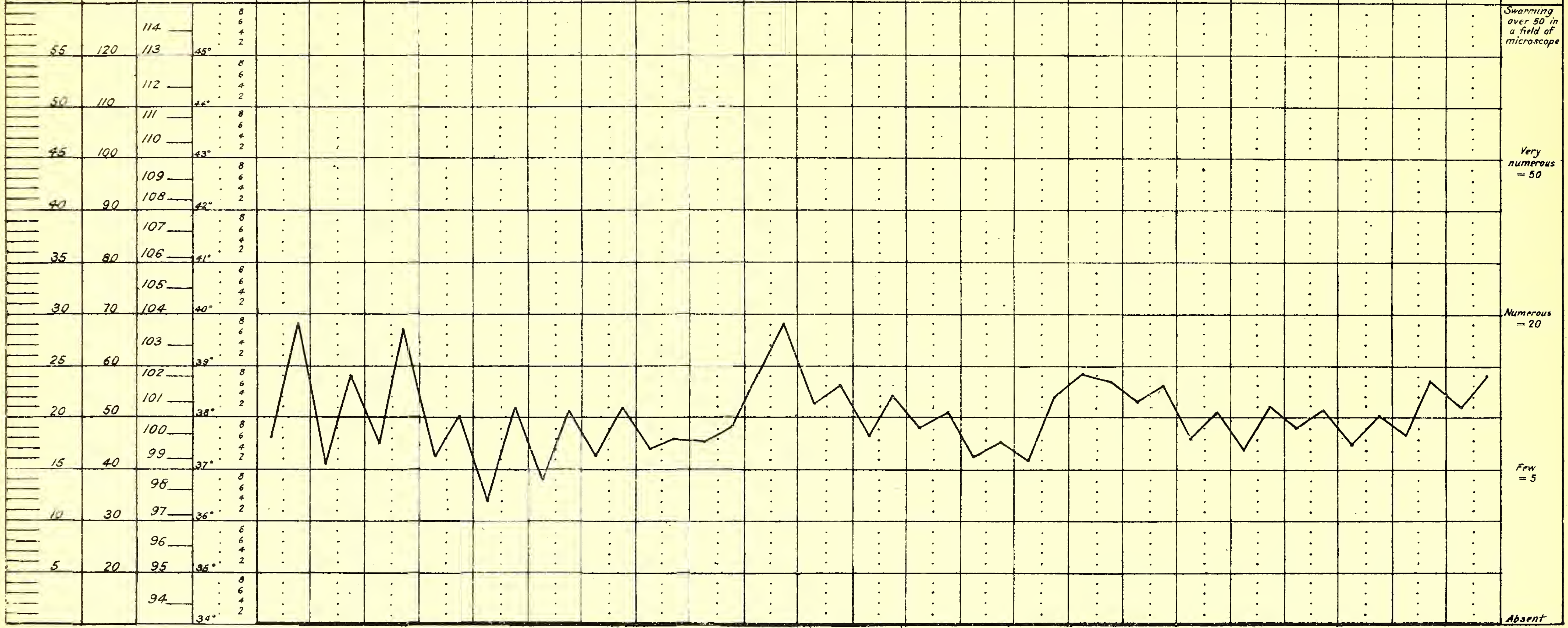
Drawn & Litho. Govt Photozinco: Office Poona 1892.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Bull. ______ Age ______ Sex ______ Colour ______

Disease ______ Date of ______ Result ______ Date of Result ______ Register No. I. ______

Dates of Observation	July 12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Aug. 1	2	3	Record of Organisms in Blood.
Days of Disease	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	
Organisms in Blood	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Respiration per minute / Pulse per minute / Temperature F C	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	



(S 415)

Hæmatozoon curve ————
Temperature........ ————

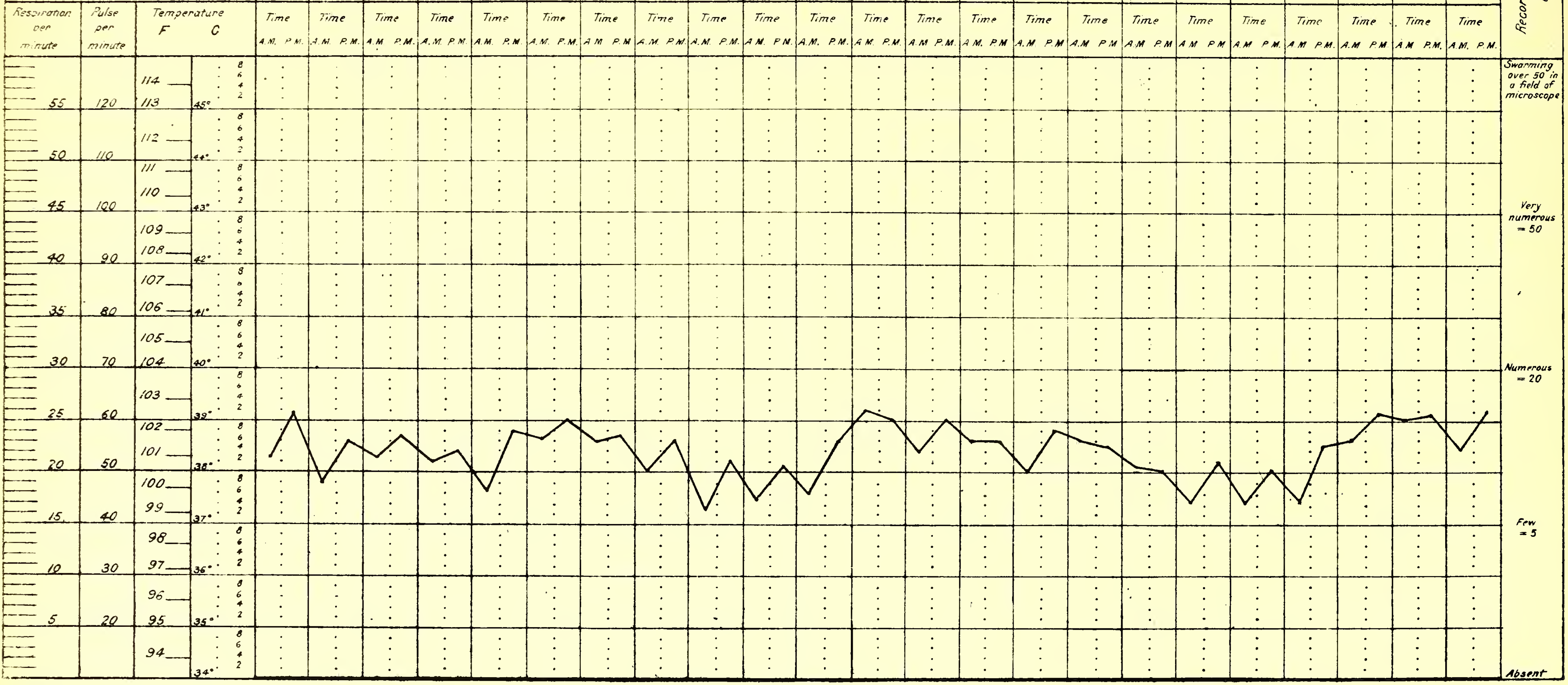
Drawn & Litho: Govt. Photozinco: Office Poona 1892.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Bull. ______ Age ______ Sex ______ Colour ______

Disease ______ Date of ______ Result ______ Date of Result ______ Register No. I. ______

Dates of Observation.	Aug. 4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Days of Disease	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151
Organisms in Blood	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—



(S 115)

Hæmatozoan curve
Temperature........

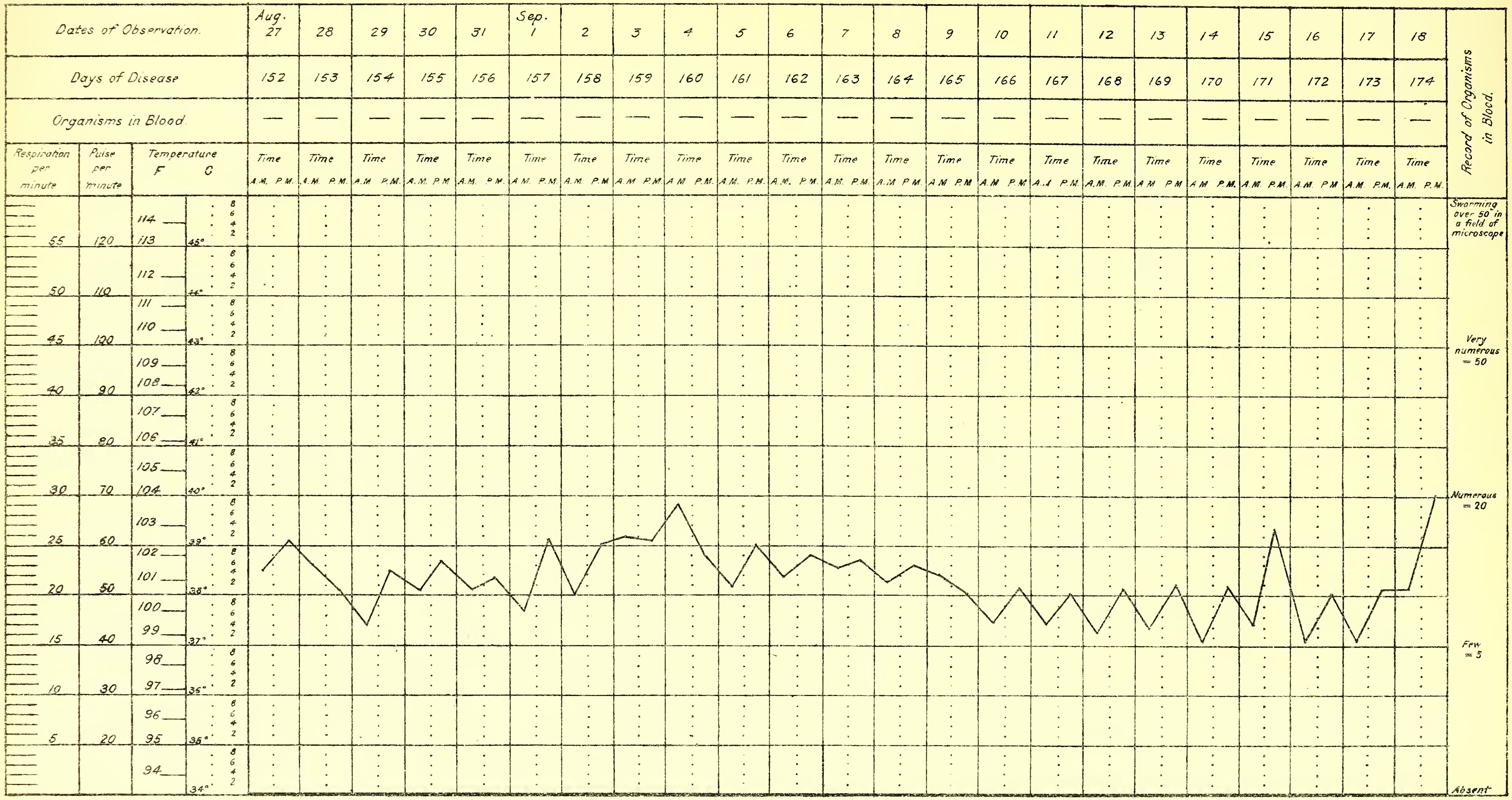
Drawn & Litho. Govt. Photozinco. Office Poona 1892.

RECORDS OF TEMPERATURE PULSE AND RESPIRATION

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Bull. ______ Age ______ Sex ______ Colour ______

Disease "Surra" ______ Date of ______ Result ______ Date of Result ______ Register No. I. ______



(S 415)

Hæmatozoon curve

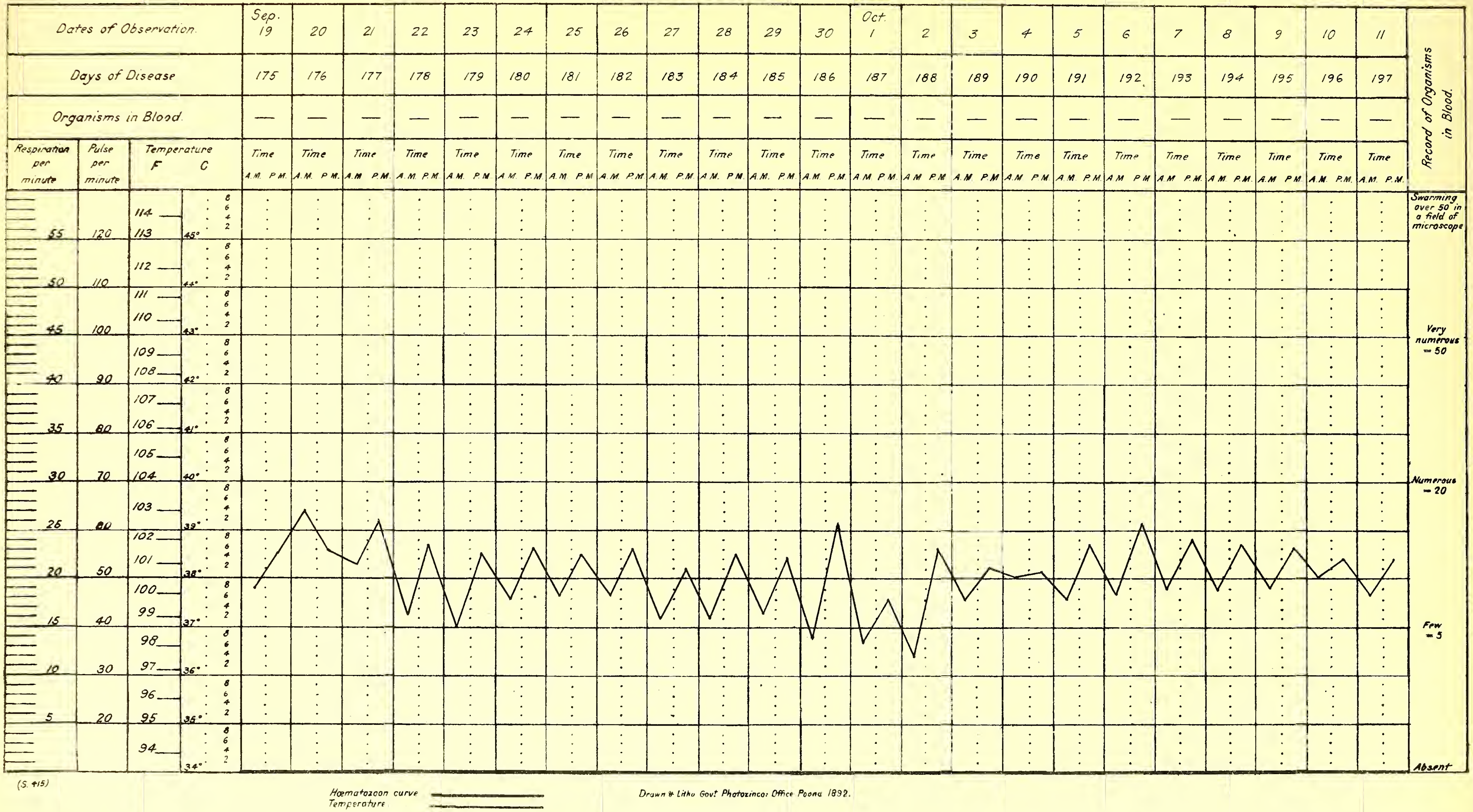
Temperature........

Drawn & Litho Govt. Photozinco: Office Poona 1892.

Bull ______ Age ______ Sex ______ Colour ______

Bull. Age Sex Colour

Disease "Surra" Date of Result Date of Result Register No. I.



Dates of Observation.	Sep. 19	20	21	22	23	24	25	26	27	28	29	30	Oct. 1	2	3	4	5	6	7	8	9	10	11
Days of Disease	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197
Organisms in Blood.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

(S. 415)

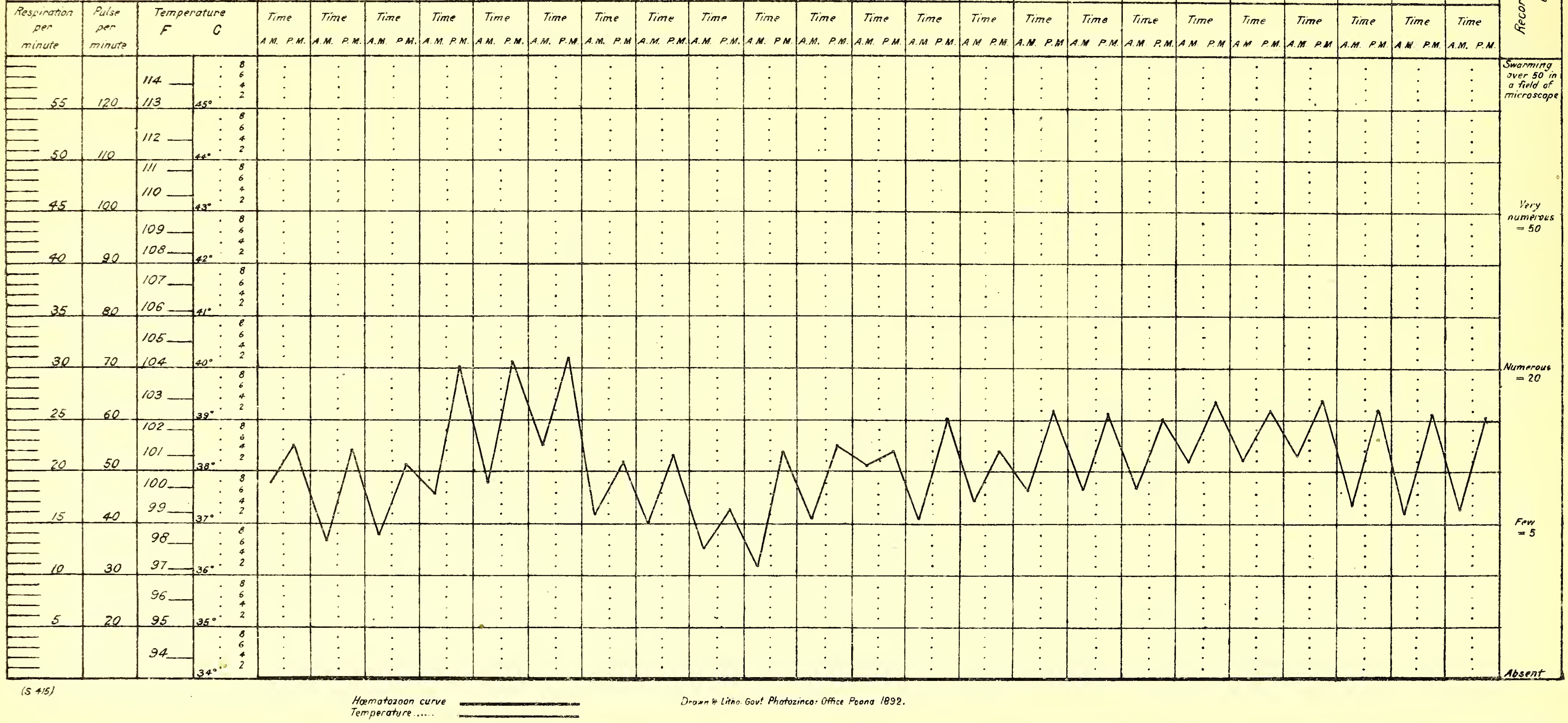
Drawn & Litho Govt. Photozinco: Office Poona 1892.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Bull ______ Age ______ Sex ______ Colour ______

Disease "Surra" ______ Date of ______ Result ______ Date of Result ______ Register No. I. ______

Dates of Observation.	Oct. 12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Nov. 1	2	3
Days of Disease	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220
Organisms in Blood.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—



(S 415)

Drawn & Litho. Govt. Photozinco: Office Poona 1892.

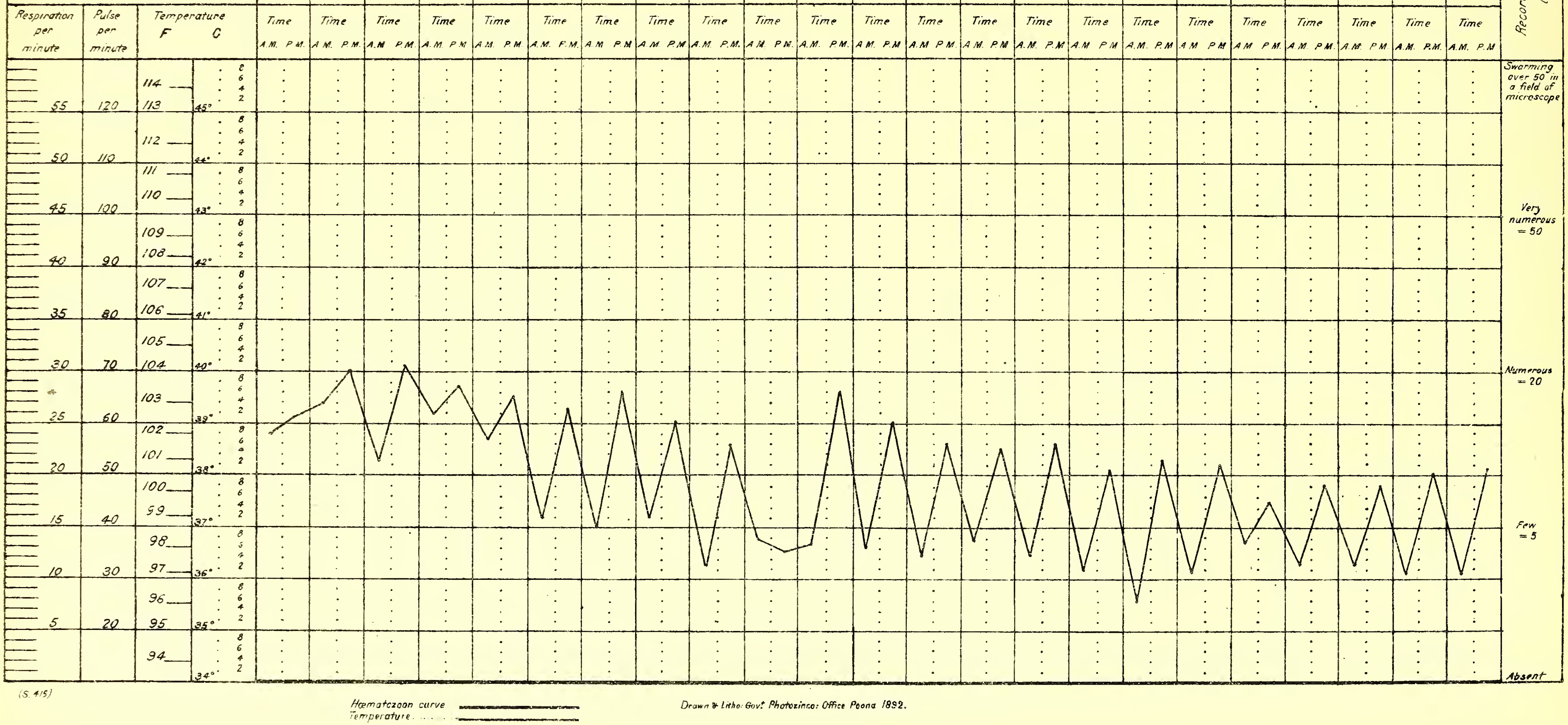
RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Bull. Age Sex Colour

Disease "Surra" Date of Result Date of Result Register No. I.

Dates of Observation.	Nov. 4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Days of Disease	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243
Organisms in Blood.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—



(S. 415)

Drawn & Litho: Govt. Photozinco: Office Poona 1892.

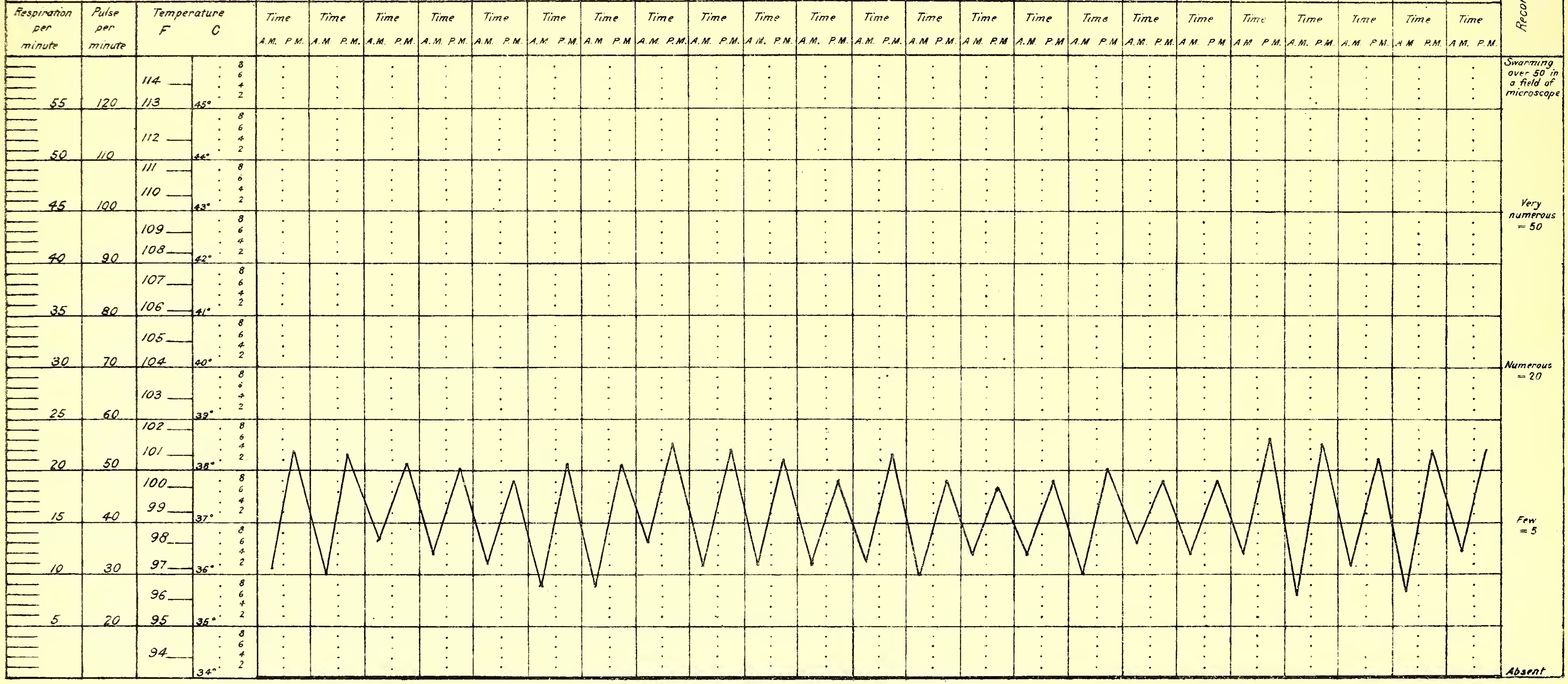
TEMPERATURE, PULSE AND RESPIRATION

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Bull Age Sex Colour

Disease *"Surra"* Date of Result Date of Result Register No. *I.*

Dates of Observation.	*Nov^r. 27*	*28*	*29*	*30*	*Dec^r. 1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*
Days of Disease	*244*	*245*	*246*	*247*	*248*	*249*	*250*	*251*	*252*	*253*	*254*	*255*	*256*	*257*	*258*	*259*	*260*	*261*	*262*	*263*	*264*	*265*	*266*
Organisms in Blood.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—



(S 415)

Hæmatozoon curve ————
Temperature .... ————

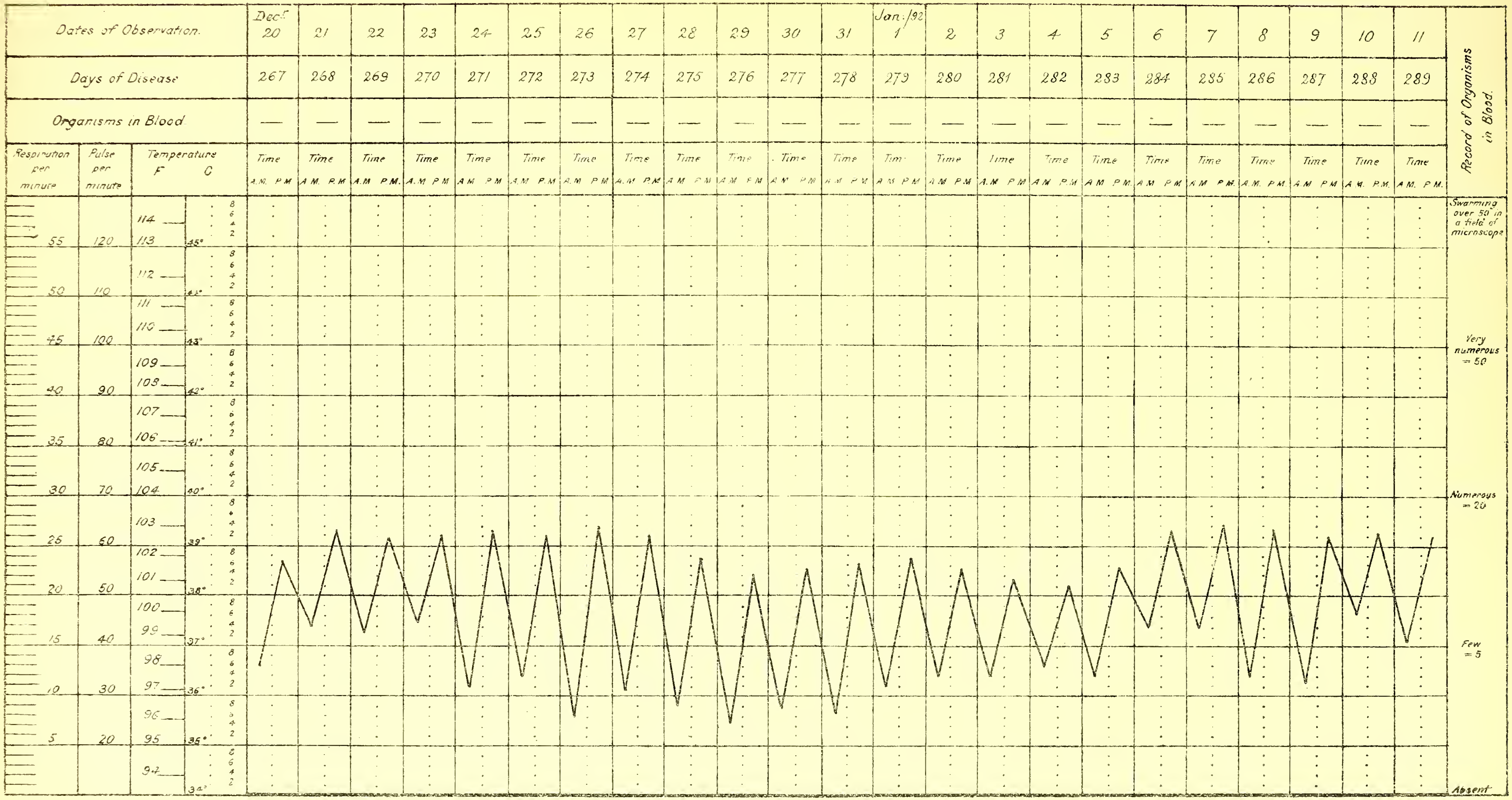
Drawn & Litho: Govt. Photozinco: Office Poona 1892

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Bull ______ Age ______ Sex ______ Colour ______

Disease "Surra" ______ Date of ______ Result ______ Date of Result ______ Register No I. ______



Dates of Observation.	Dec.r 20	21	22	23	24	25	26	27	28	29	30	31	Jan: /92 1	2	3	4	5	6	7	8	9	10	11
Days of Disease	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289
Organisms in Blood	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

(S 415)

Hæmatozoon curve
Temperature

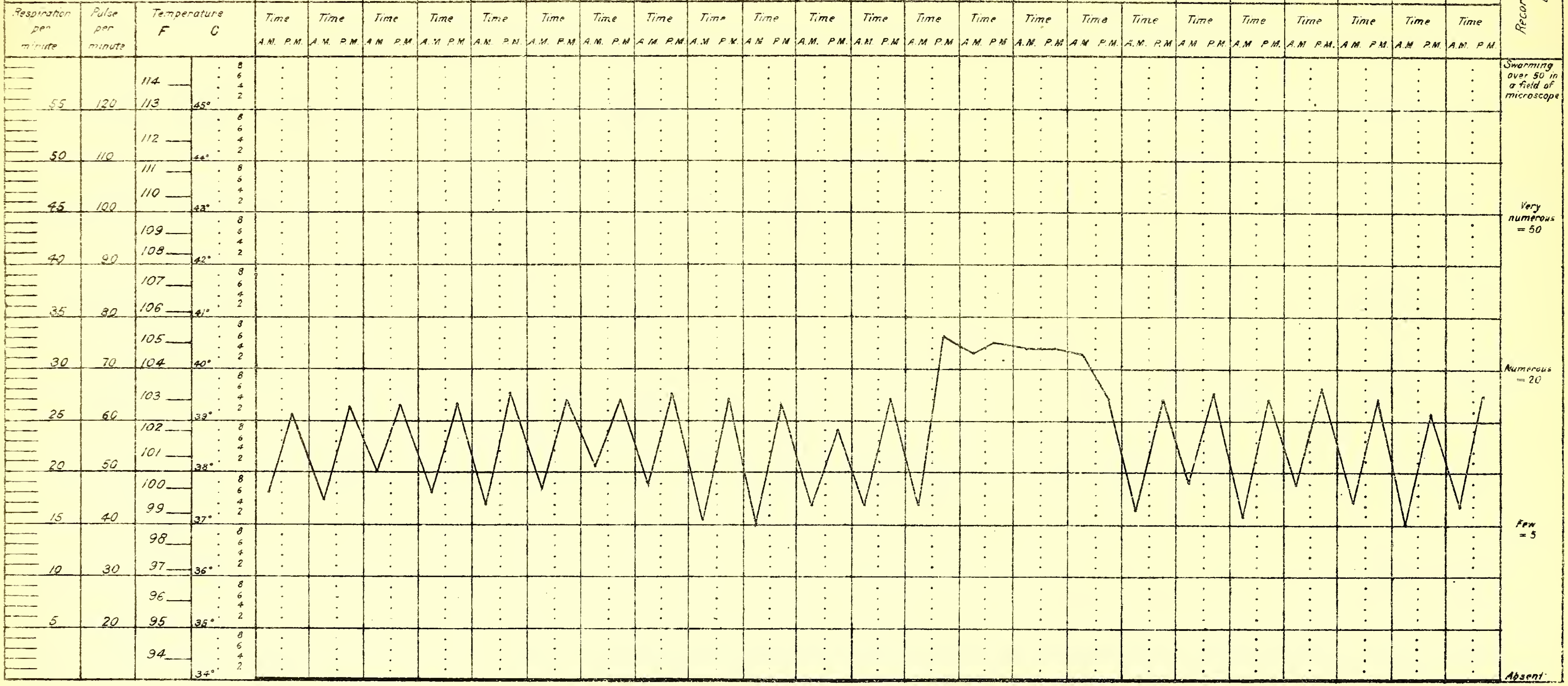
Drawn & Litho: Govt Photozinco: Office Poona 1892.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Bull ____ Age ____ Sex ____ Colour ____

Disease "Surra" ____ Date of ____ Result ____ Date of Result ____ Register No. I ____

Dates of Observation.	Jan/92 12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Feb. 92 1	2	3
Days of Disease	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312
Organisms in Blood.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—



(S 415)

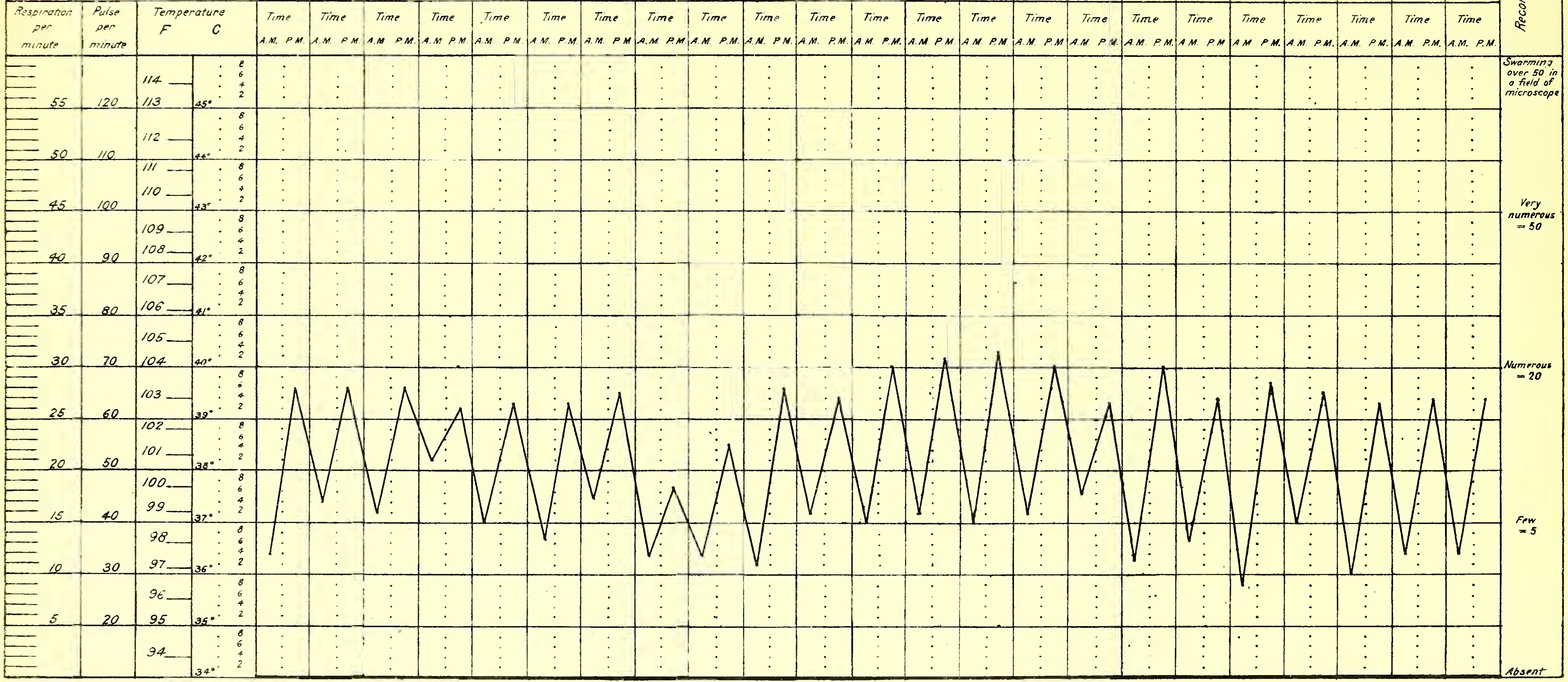
Hæmatozoon curve
Temperature ....

Drawn & Litho. Govt Photozinco: Office Poona 1892.

Bull. ______________________ Age ________ Sex ________ Colour ________

Disease ______________ Date of ______________ Result ______________ Date of Result ________ Register No. 1 ________

Dates of Observation.	Feb. 92 4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
*Days of Disease	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335
Organisms in Blood	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—



(S 4/5)

Hæmatozoon curve ————
Temperature ......

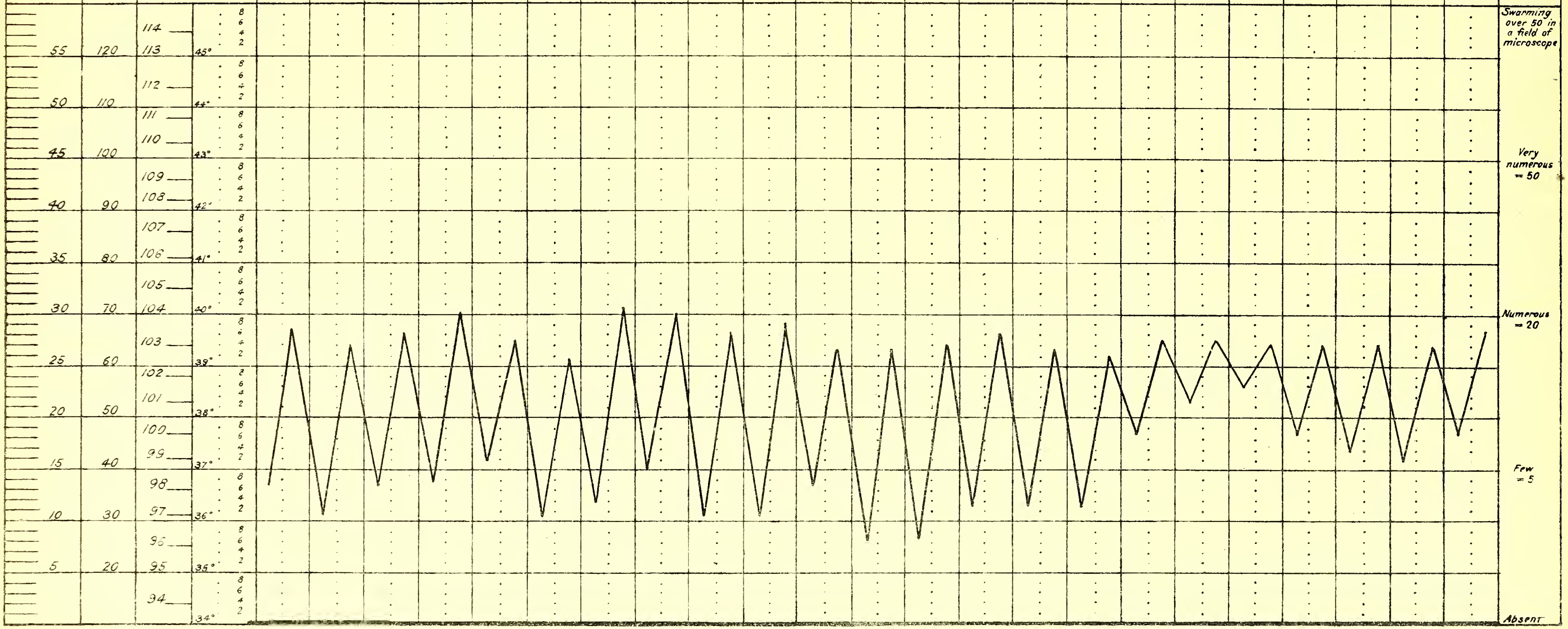
Drawn & Litho. Govt Photozinco: Office Poona 1892.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Bull. Age Sex Colour

Disease "Surra" Date of Result Date of Result Register No I.

Dates of Observation	Feb: 92 27	28	29	March 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Days of Disease	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358
Organisms in Blood	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Respiration per minute / Pulse per minute / Temperature F C	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.



(S 4/5)

Hæmatozoon curve
Temperature . .

Drawn & Litho Govt. Photozinco: Office Poona 1892.

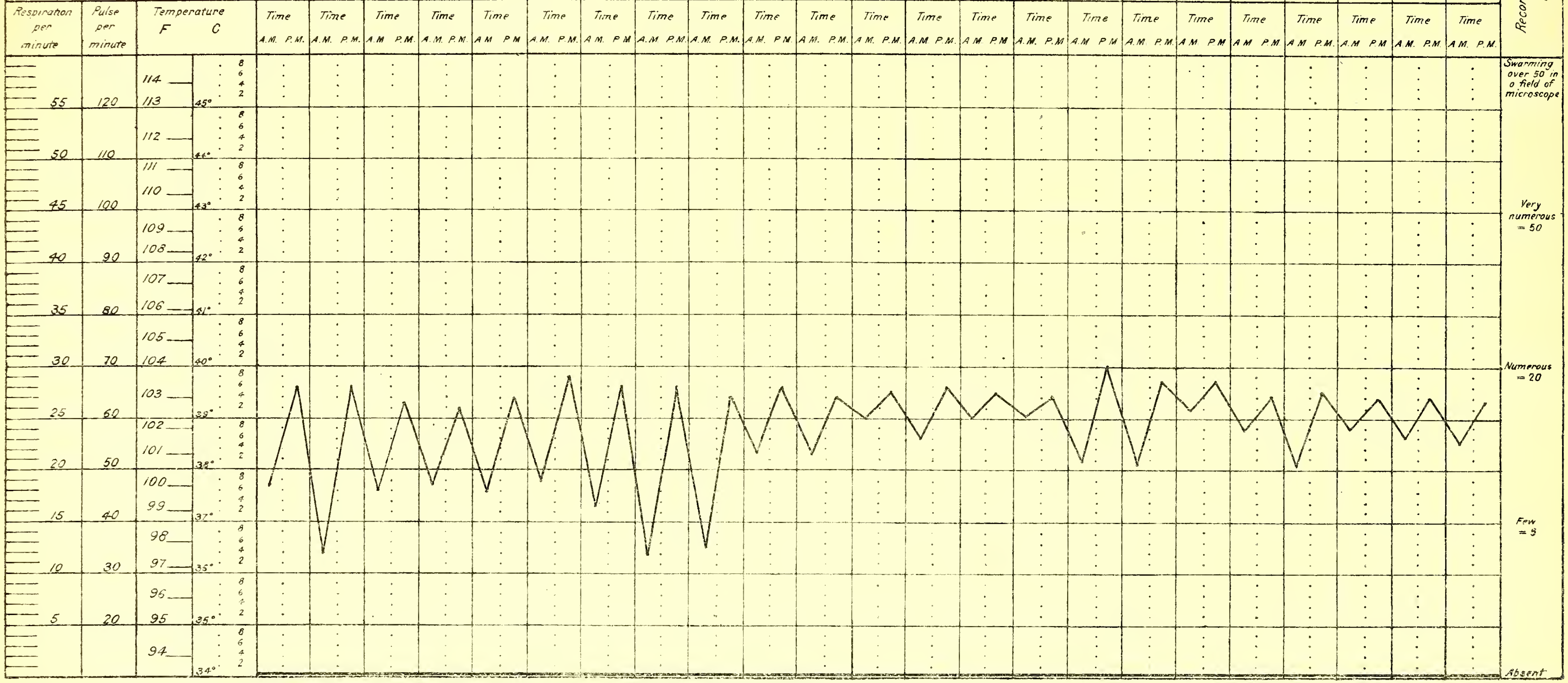
RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Bull. ______ Age ______ Sex ______ Colour ______

Disease "Surra" ______ Date of ______ Result ______ Date of Result ______ Register No. I. ______

Dates of Observation.	March 21	22	23	24	25	26	27	28	29	30	31	April 1	2	3	4	5	6	7	8	9	10	11	12
Days of Disease	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381
Organisms in Blood	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—



(S 4.5.)

Hæmatozoon curve ______

Temperature . . . ______

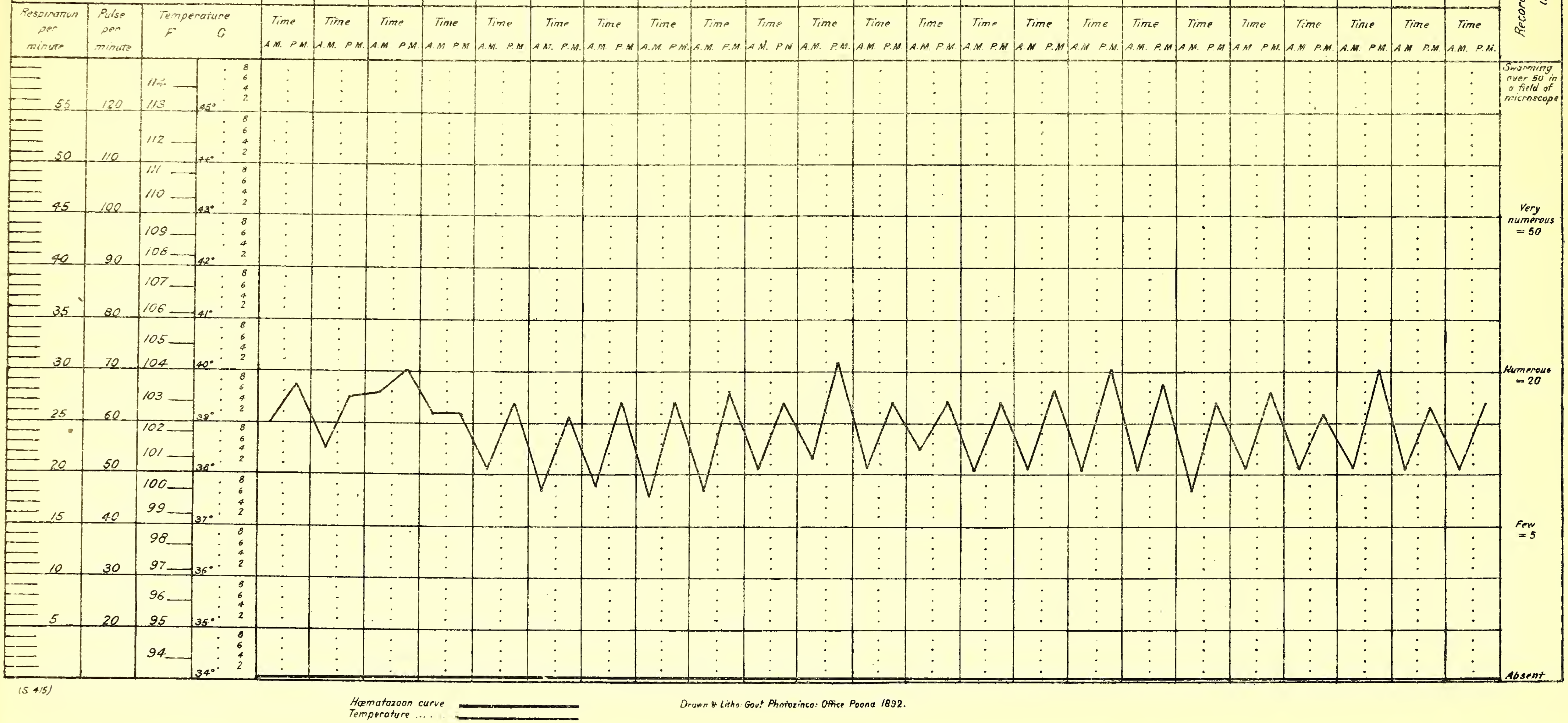
Drawn & Lith: Govt Photozinco: Office Poona 1892.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Bull. Age Sex Colour

Disease "Surra" Date of Result Date of Result Register No. I.

Dates of Observation.	April 13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	May 1	2	3	4	5
Days of Disease	382	383	384	385	386	387	388	389	390	331	392	393	394	395	396	397	398	399	400	401	402	403	404
Organisms in Blood.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—



(S 415)

Drawn & Litho: Govt Photozinco: Office Poona 1892.

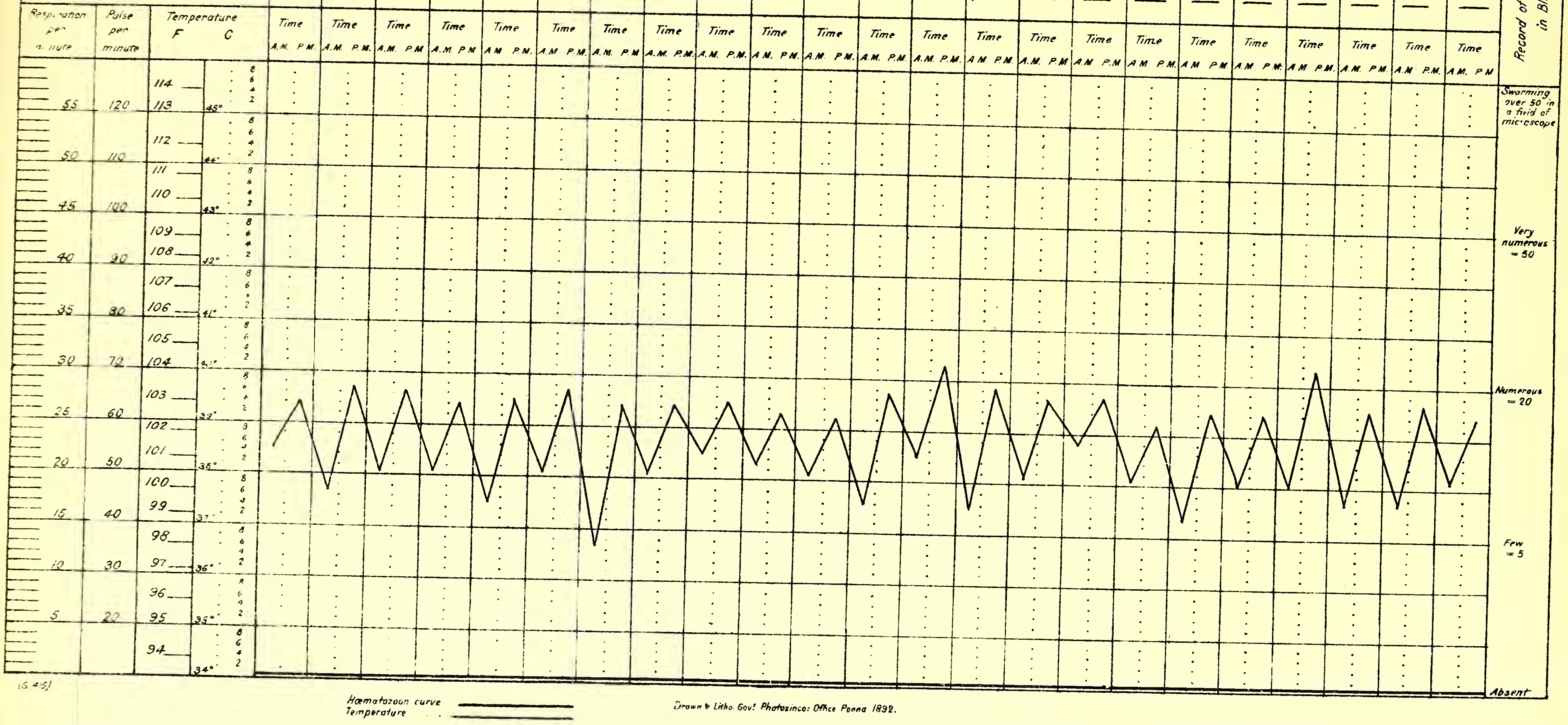
RECORDS OF TEMPERATURE PULSE

Bul ——

Disease —— Date of —— Result —— Age —— Sex —— Colour ——

Date of Result —— Register No. ——

Dates of Observation	May 6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Days of Disease	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427
Organisms in Blood	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—



(S 415)

Drawn & Litho. Gov! Photozinco: Office Poona 1892.

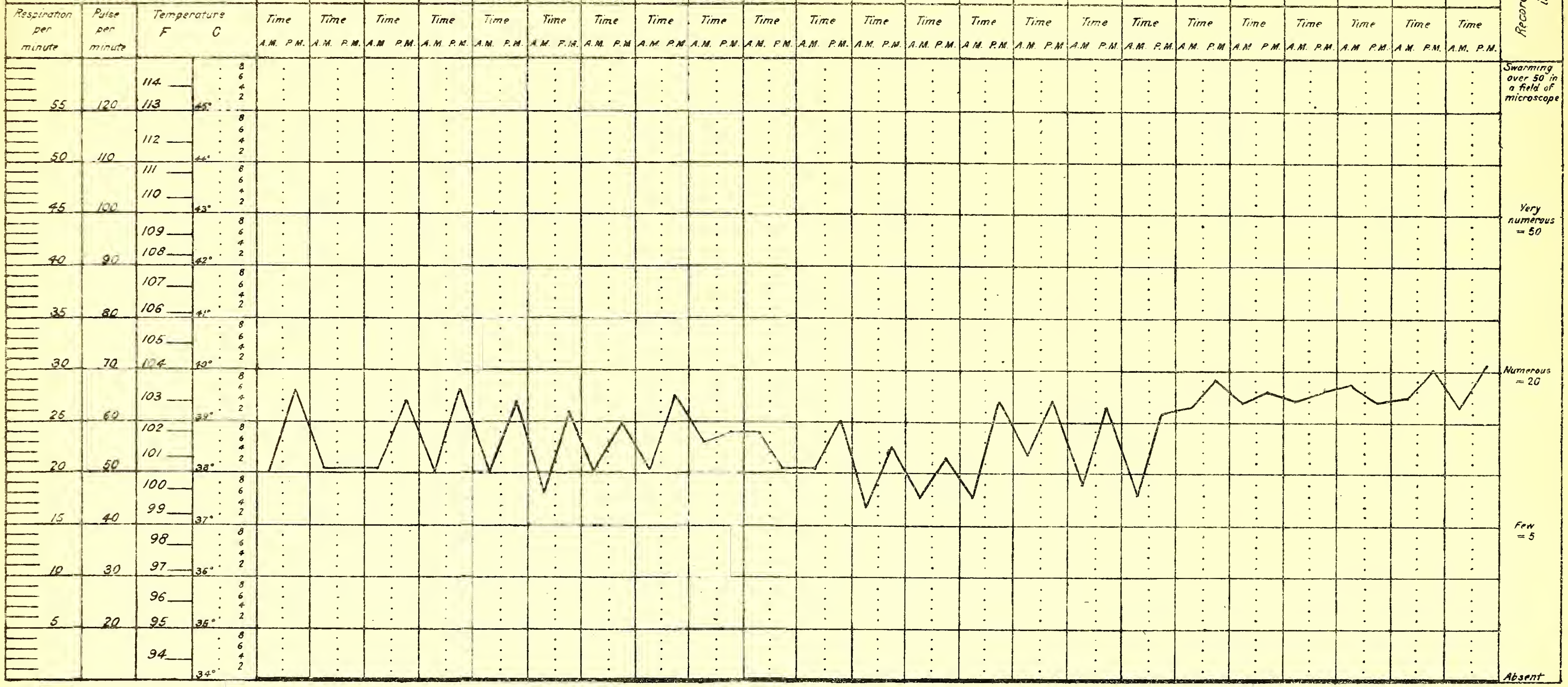
RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Bull _____ Age _____ Sex _____ Colour _____

Disease "Surra" Date of _____ Result _____ Date of Result _____ Register No. I.

Dates of Observation.	May 29	30	31	June 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Days of Disease	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450
Organisms in Blood	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—



(S. 415)

Hæmatozoon curve
Temperature........

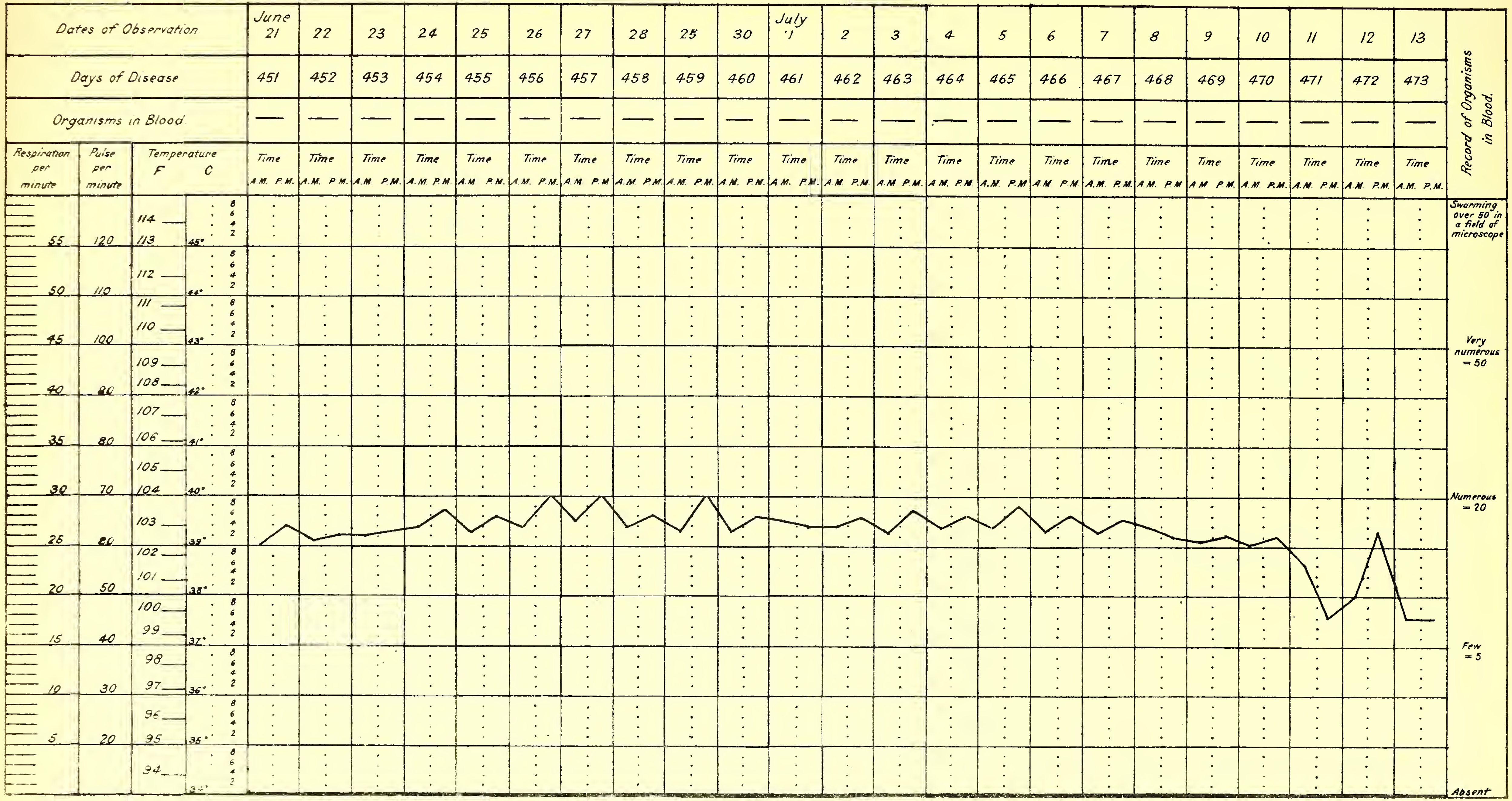
Drawn & Litho. Govt. Photozinco: Office Poona 1892.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Bull. ______ Age ______ Sex ______ Colour ______

Disease "Surra" ______ Date of ______ Result ______ Date of Result ______ Register No. I.



S 451

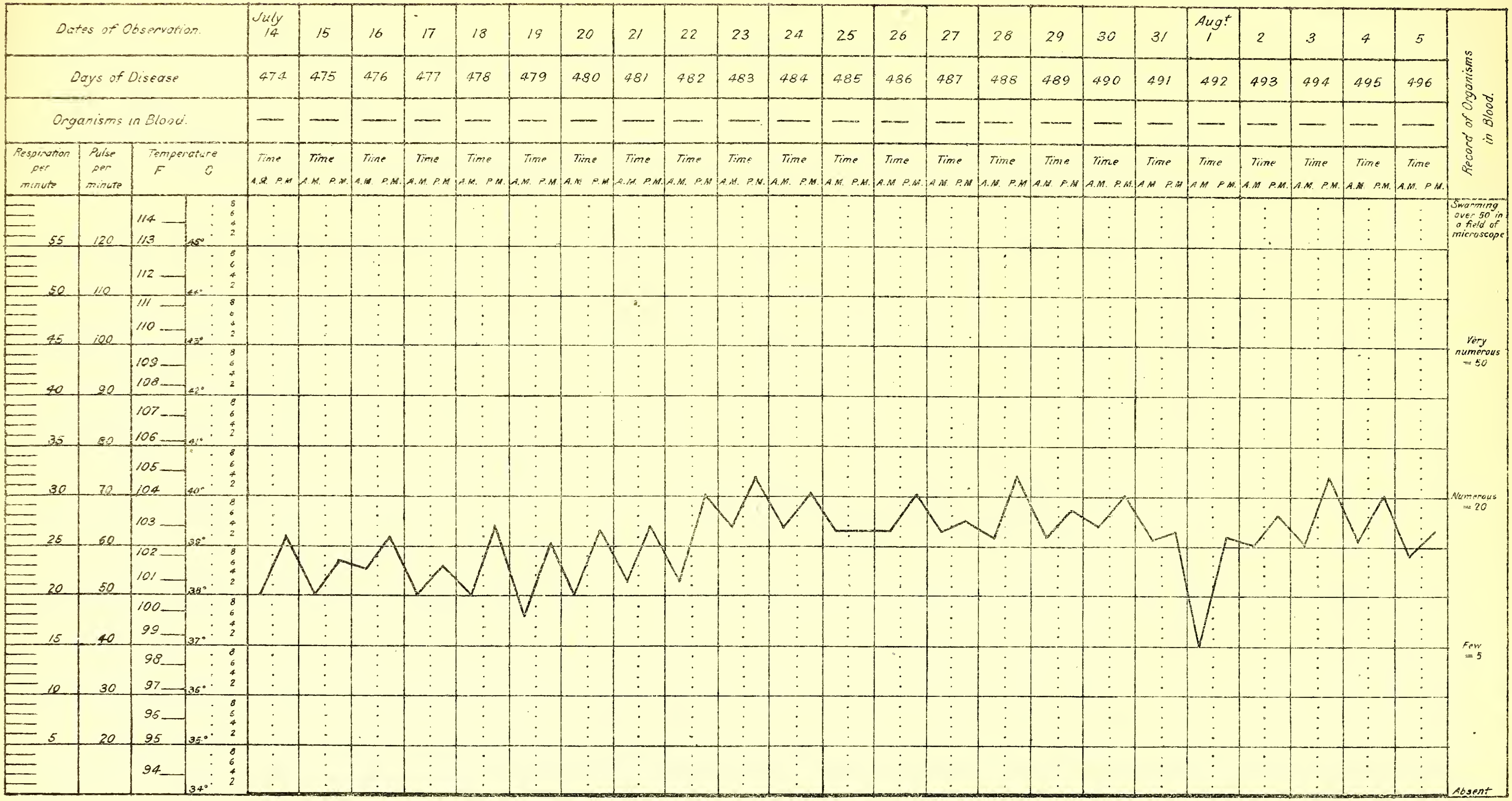
Hæmatozoon curve
Temperature ......

Drawn & Litho Govt. Photozinco. Office Poona 1892.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Bull. Age Sex Colour

Disease "Surra" Date of Result Date of Result Register No. I.



(S. 415)

Hæmatozoan curve

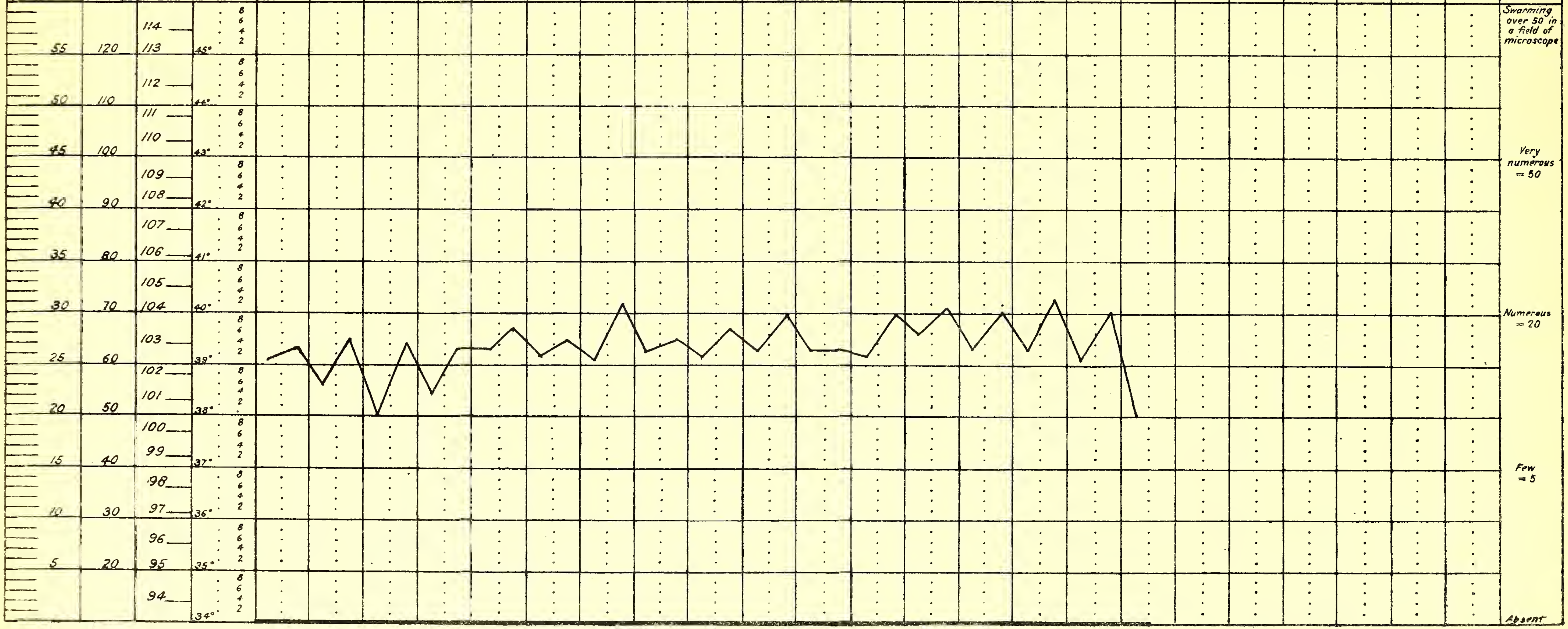
Temperature . . . . . .

Drawn & Litho: Govt. Photozinco: Office Poona 1892.

Bull. ______ Age ______ Sex ______ Colour ______

Disease "Surra" ______ Date of ______ Result ______ Date of Result ______ Register No. I.______

Dates of Observation.	Augt 6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22							Record of Organisms in Blood.
Days of Disease	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513							
Organisms in Blood.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—							
Respiration per minute / Pulse per minute / Temperature F C	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	



(5.415)

Hæmatozoon curve
Temperature

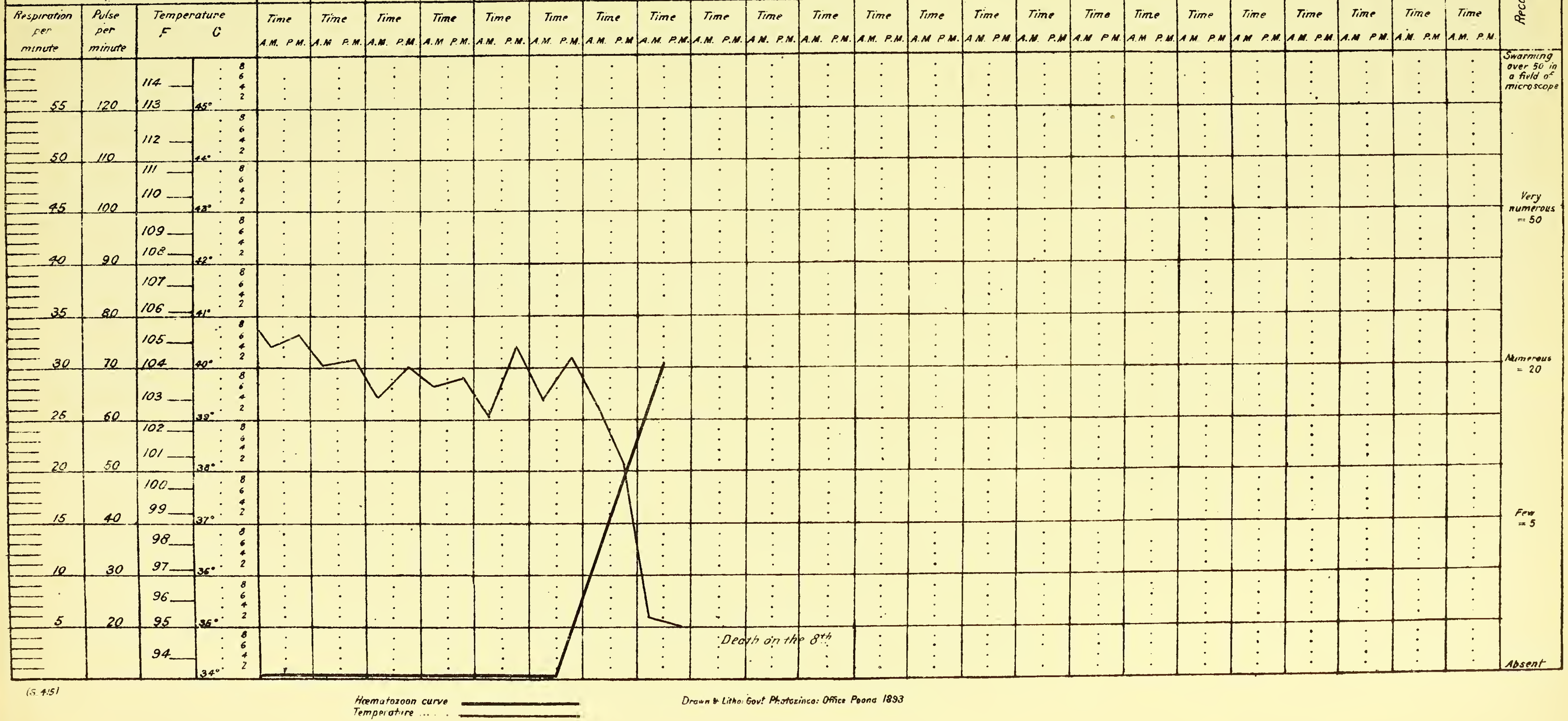
Drawn & Litho Govt Photozinco: Office Poona 1892.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

________________ Age ______ Sex ______ Colour ______

Disease ______ Date of ______ Result ______ Date of Result ______ Register No. I

Dates of Observation.	Octr 31	Novr 1	2	3	4	5	6	7	8														Record of Organisms in Blood
Days of Disease	127	128	129	130	131	132	133	134	135														
Organisms in Blood.	—	—	—	—	—	—	F	N															



(S 451)

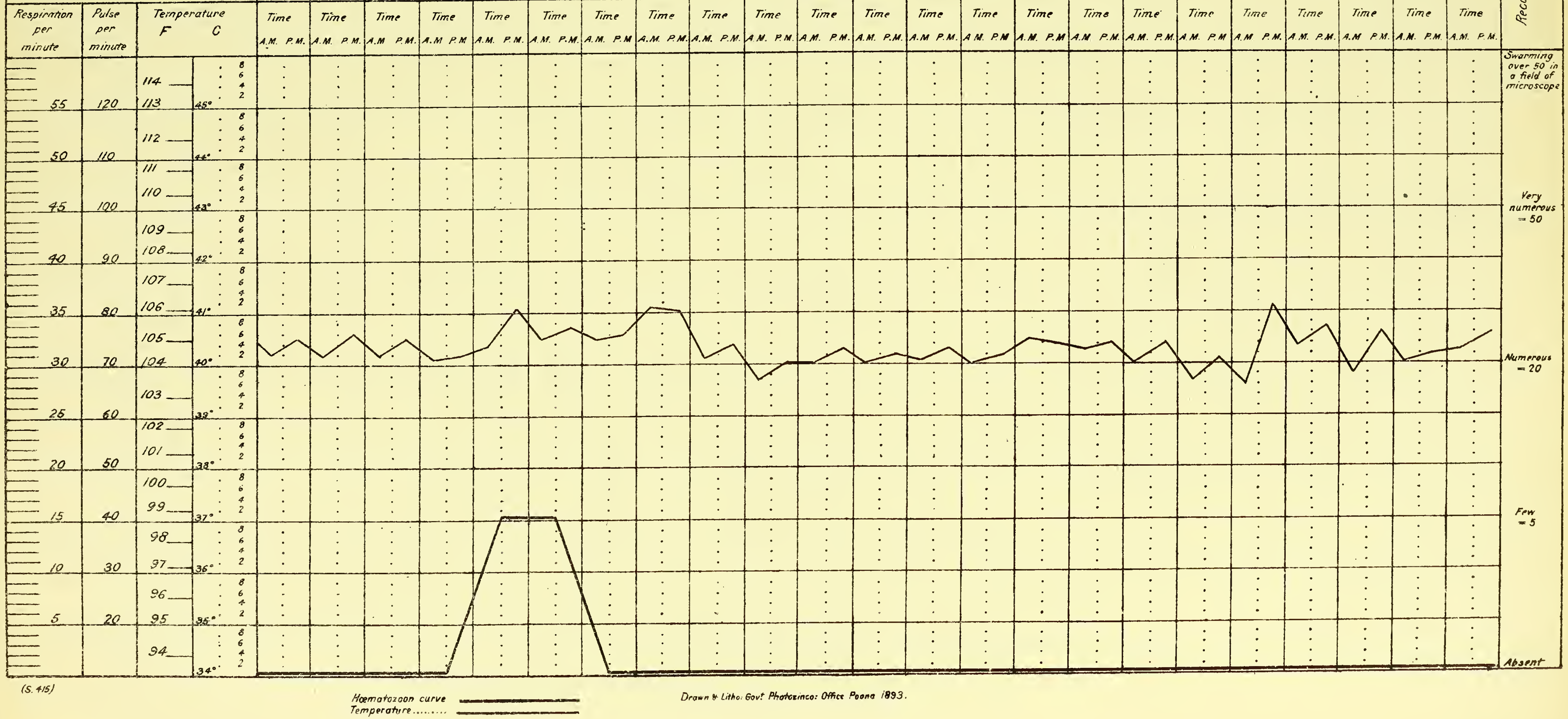
Drawn & Litho: Govt Photozinco: Office Poona 1893

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

________ Age ______ Sex ______ Colour ______

Disease ______ Date of ______ Result ______ Date of Result ______ Register No. ______

Dates of Observation.	Oct.r 8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Days of Disease	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126
Organisms in Blood.	—	—	—	—	F	F	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—



(S. 415)

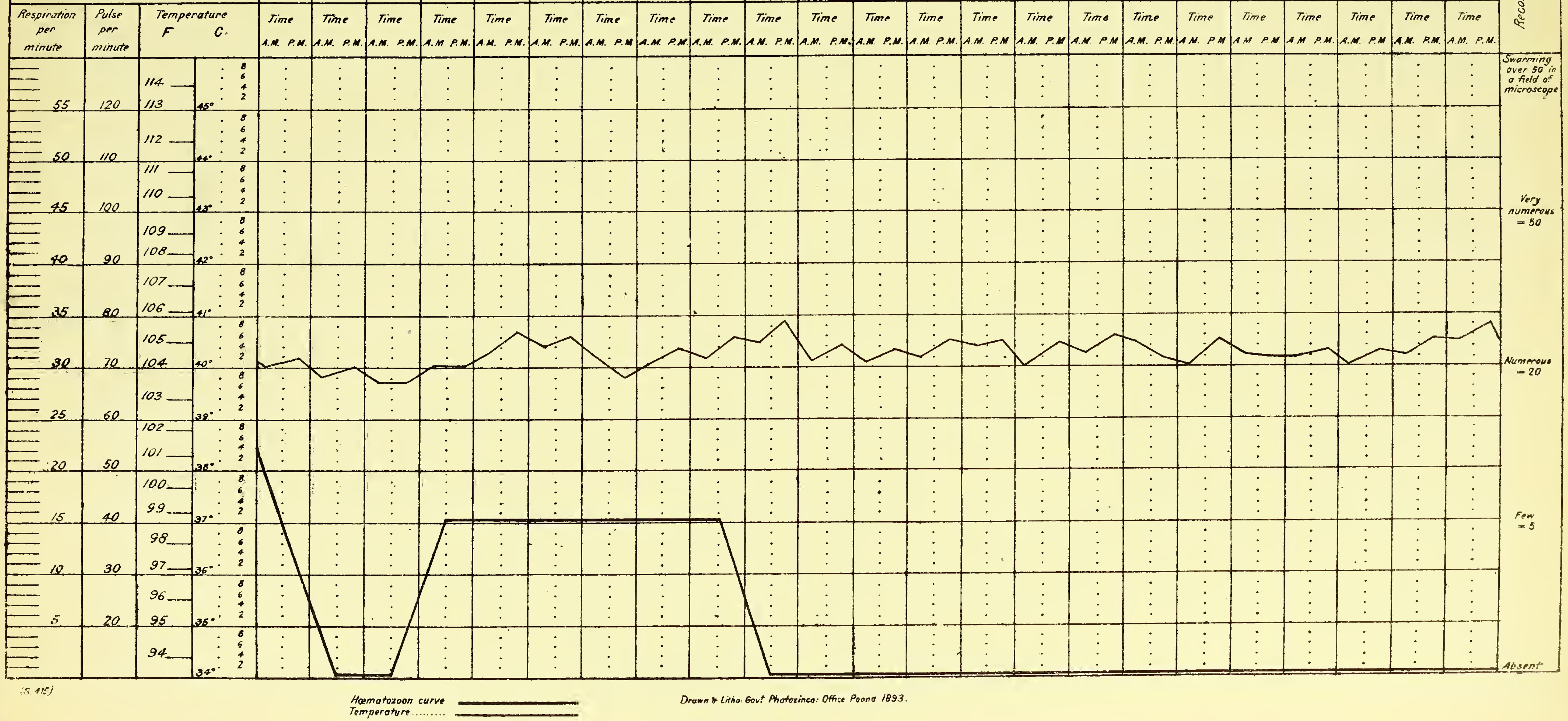
Drawn & Litho: Gov.t Photozinco: Office Poona 1893.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age ________ Sex ________ Colour ________

Disease ________ Date of ________ Result ________ Date of Result ________ Register No. ________

Dates of Observation.	Sept.r 15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Oct.r 1	2	3	4	5	6	7
Days of Disease	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103
Organisms in Blood.	F	—	—	F	F	F	F	F	F	—	—	—	—	—	—	—	—	—	—	—	—	—	—



(S. 415)

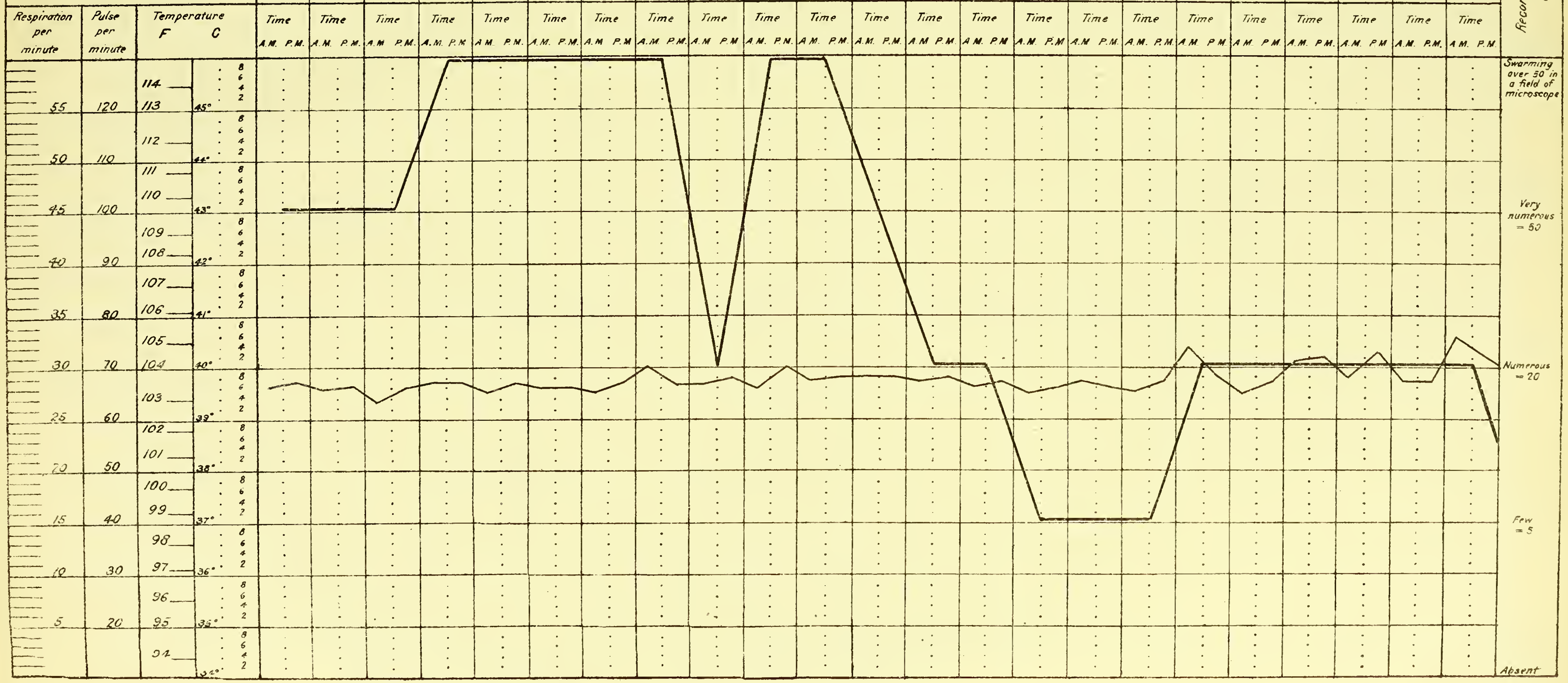
Drawn & Litho: Gov.t Photozinco: Office Poona 1893.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age ______ Sex ______ Colour ______

Disease ______ Date of ______ Result ______ Date of Result ______ Register No. ______

Dates of Observation.	August 23	24	25	26	27	28	29	30	31	Sept.r 1	2	3	4	5	6	7	8	9	10	11	12	13	14
Days of Disease	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
Organisms in Blood.	VN	VN	VN	S	S	S	S	S	N	S	S	VN	N	N	F	F	F	N	N	N	N	N	N



(S 415)

Hæmatozoon curve ————
Temperature .... ————

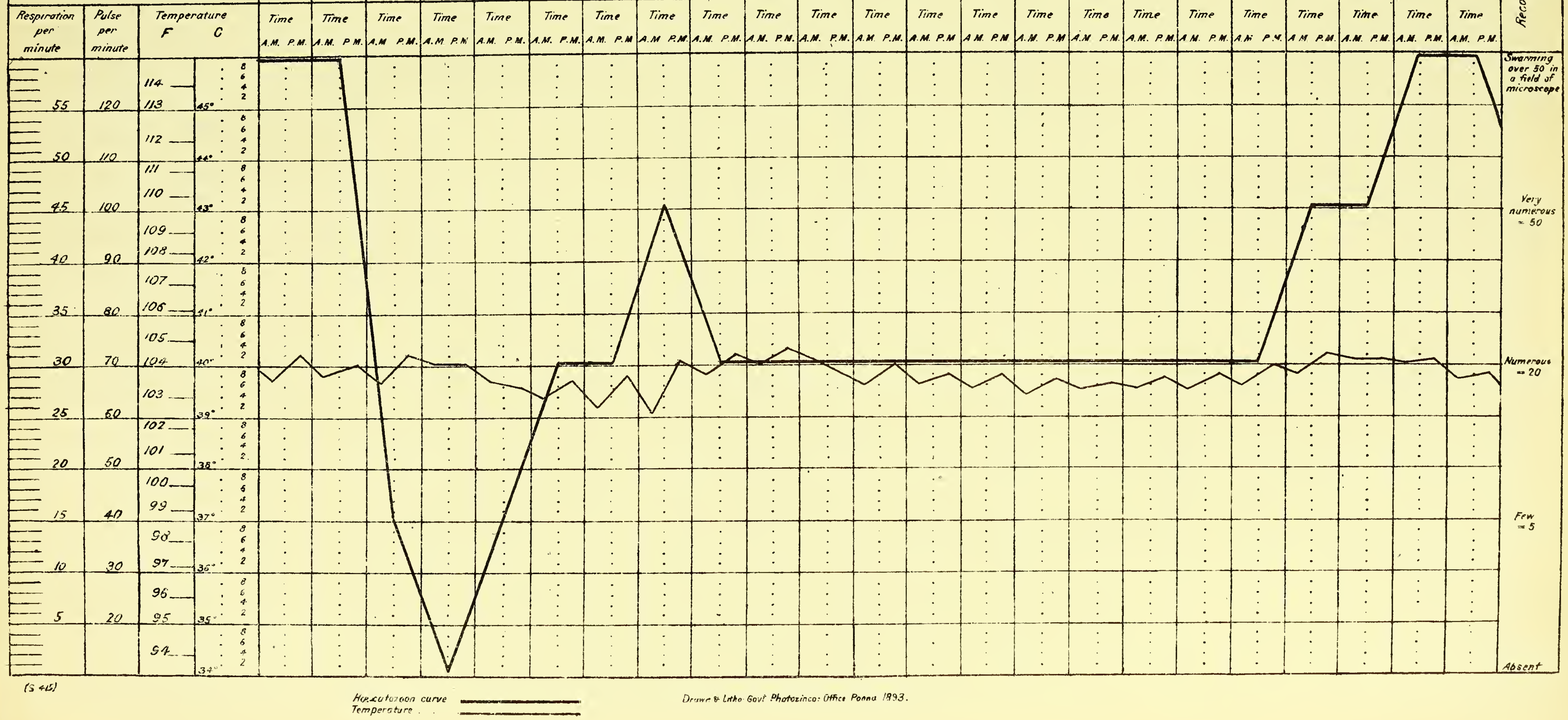
Drawn & Litho. Govt. Photozinco: Office Poona 1893.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

______ Age ______ Sex ______ Colour ______

Disease ______ Date of ______ Result ______ Date of Result ______ Register No. I ______

Dates of Observation.	July 31	August 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Days of Disease	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57
Organisms in Blood.	S	S	F	—	F	N	N	VN	N	N	N	N	N	N	N	N	N	N	N	VN	VN	S	S



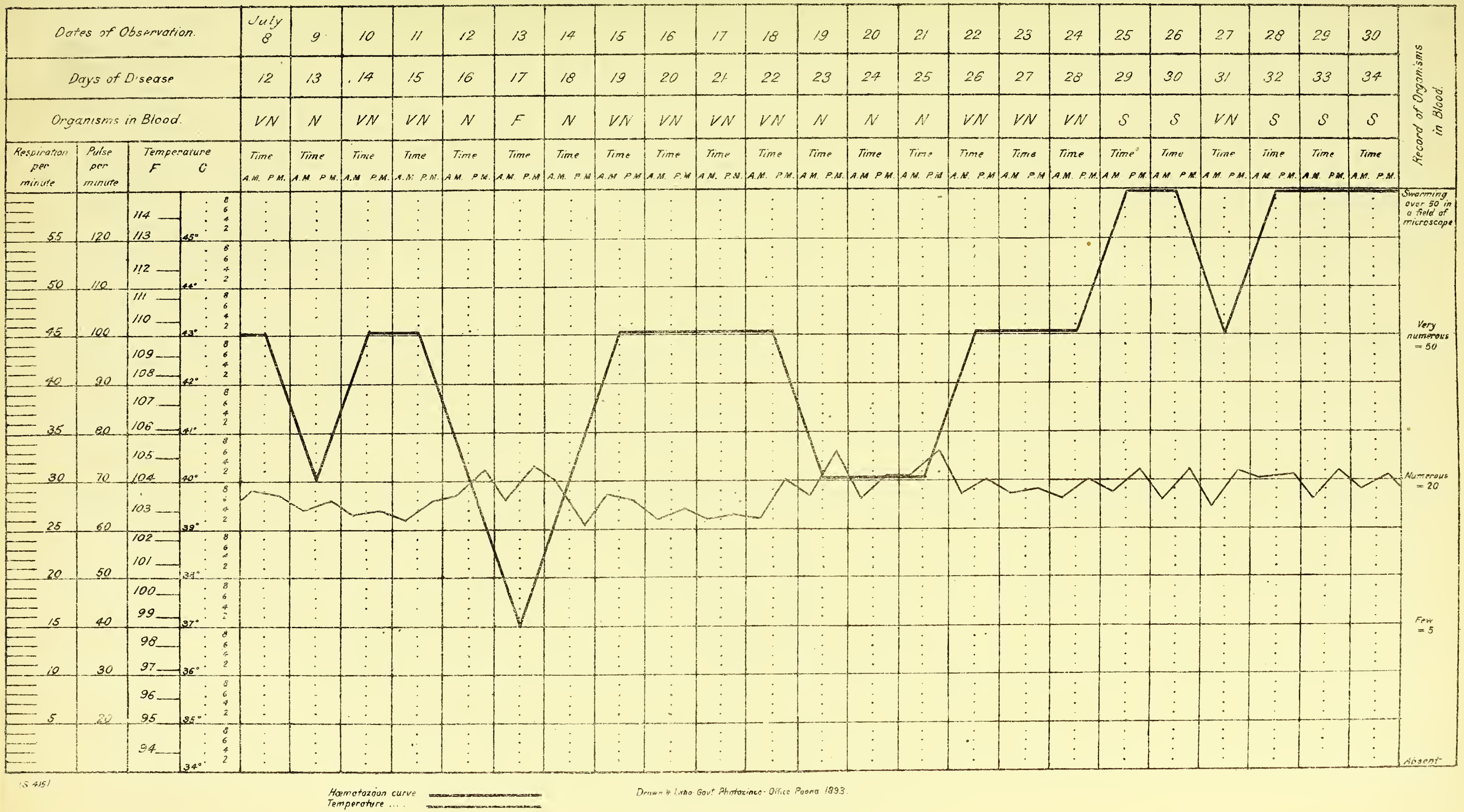
(S 415)

Drawn & Litho Govt Photozinco: Office Poona 1893.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age ______ Sex ______ Colour ______

Disease ______ Date of ______ Result ______ Date of Result ______ Register No. I ______



(S 415)

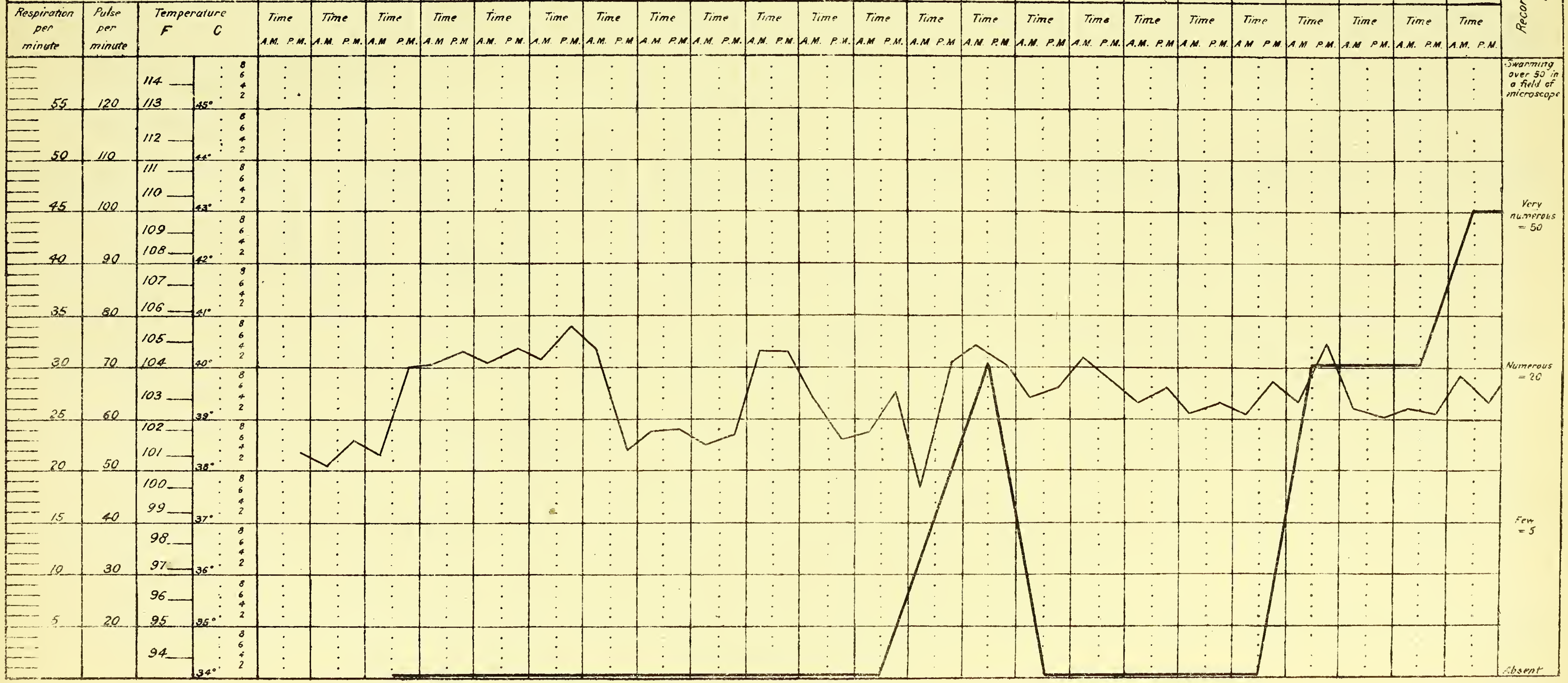
Drawn & Litho Govt Photozinco Office Poona 1893.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

G.P.I. Subcutaneous Inoculation with 0·2cc of blood from Bull No. I. Age ____ Sex ____ Colour ____

Disease "Surra" ____ Date of Inoc: 17th June 91. ____ Result Death ____ Date of Result 8-11-91 Register No. I. ____

Dates of Observation.	June 15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	July 1	2	3	4	5	6	7
Days of Disease													1	2	3	4	5	6	7	8	9	10	11
Organisms in Blood			—	—	—	—	—	—	—	—	—	—	F	N	—	—	—	—	—	N	N	N	VN



(S.415)

Hæmatozoon curve
Temperature........

Drawn & Litho. Govt. Photozinco: Office Poona 1893.

GUINEA-PIG No. I.

Month and date.	Examination of blood.	Temperature. °C.	
		A.M.	P.M.
1891.			
15th June	....	...	38·4
16th ,,	....	38·1	38·6
17th ,,	Inoculated	38·3	40·
18th ,,	....	40·1	40·3
19th ,,	Enlarged glands at seat of inoculation	40·1	40·4
20th ,,	Glands increased in size	40·2	40·8
21st ,,	,, ,,	40·4	38·4
22nd ,,	Glands enlarged	38·7	38·8
23rd ,,	,,	38·5	39·7
24th ,,	Hæmatozoa absent.	40·3	40·3
25th ,,	,, ,,	39·4	38·6
26th ,,	,, ,,	38·7	39·5
27th ,,	,, few	37·7	40·1
28th ,,	,, numerous.	40·4	40·
29th ,,	,, absent	39·4	39·6
30th ,,	,, ,,	40·2	39·7
1st July	,, ,,	39·3	39·6
2nd ,,	,, ,,	39·1	39·3
3rd ,,	,, ,,	39·1	39·7
4th ,,	,, numerous.	39·3	40·4
5th ,,	,, ,,	39·2	39·
6th ,,	,, ,,	39·2	39·1
7th ,,	Hæmatozoa very numerous	39·8	39·3
8th ,,	,, ,,	39·4	39·7
9th ,,	,, ,,	39·3	39·6
10th ,,	,, ,,	39·2	39·4
11th ,,	,, ,,	39·7	39·6
12th ,,	,, ,,	39·	40·2
13th ,,	,, few	39·4	40·3
14th ,,	,, numerous.	40·	39·1
15th ,,	,, very ,,	39·7	39·6
16th ,,	,, ,, ,,	40·2	40·4
17th ,,	,, ,, ,,	40·2	40·3
18th ,,	,, ,, ,,	39·2	40·
19th ,,	,, ,, ,,	39·7	40·6
20th ,,	,, ,, ,,	39·6	40·1
21st ,,	,, ,, ,,	40·1	40·6
22nd ,,	,, ,, ,,	39·7	40·
23rd ,,	,, ,, ,,	39·7	39·8
24th ,,	,, ,, ,,	39·6	40·
25th ,,	,, swarming	39·7	40·2
26th ,,	,, ,,	39·6	40·2
27th ,,	,, very numerous.	39·5	40·2
28th ,,	,, swarming	40·	40·1
29th ,,	,, ,,	39·6	40·2
30th ,,	,, ,,	39·8	40·1
31st ,,	,, ,,	39·7	40·2
1st August	,, ,,	39·8	40·
2nd ,,	,, very numerous.	39·7	40·2
3rd ,,	,, few	40·	40·
4th ,,	,, absent	39·7	39·6
5th ,,	,, few	39·4	39·7
6th ,,	,, numerous	39·2	39·8
7th ,,	,, ,,	39·1	40·1
8th ,,	,, very ,,	39·8	40·2
9th ,,	,, ,,	40·	40·3
10th ,,	,, few	40·1	39·8
11th ,,	,, numerous	39·6	40·
12th ,,	,, ,,	39·6	39·8
13th ,,	,, ,,	39·5	39·8
14th ,,	,, ,,	39·4	39·7
15th ,,	,, ,,	39·5	39·6
16th ,,	,, ,,	39·5	39·7
17th ,,	,, ,,	39·5	39·8
18th ,,	,, ,,	39·6	40·
19th ,,	,, very ,,	39·8	40·2
20th ,,	,, ,, ,,	40·1	40·1
21st ,,	,, swarming	40·	40·1
22nd ,,	,, ,,	39·7	39·8
23rd ,,	,, very numerous.	39·6	39·7
24th ,,	,, ,, ,,	39·5	39·6
25th ,,	,, ,, ,,	39·3	39·6

Month and date.	Blood.	Temperature. °C.	
		A.M.	P.M.
26th August	Hæmatozoa swarming	39·7	39·7
27th ,,	,, ,,	39·5	39·7
28th ,,	,, ,,	39·6	39·6
29th ,,	,, ,,	39·5	39·7
30th ,,	,, ,,	40·	39·7
31st ,,	,, ,,	39·7	39·8
1st September	,, numerous	39·6	40·
2nd ,,	,, swarming	39·7	39·8
3rd ,,	,, ,,	39·8	39·8
4th ,,	,, very numerous.	39·7	39·8
5th ,,	,, ,,	39·6	39·7
6th ,,	,, ,,	39·5	39·6
7th ,,	,, few	39·7	39·6
8th ,,	,, ,,	39·5	39·7
9th ,,	,, ,,	40·4	39·8
10th ,,	,, numerous	39·5	30·7
11th ,,	,, ,,	40·1	40·2
12th ,,	,, ,,	39·8	39·3
13th ,,	,, ,,	39·7	40·7
14th ,,	,, ,,	40·6	40·2
15th ,,	,, ,,	40·	40·1
16th ,,	,, few	39·8	43·
17th ,,	,, absent	39·7	39·7
18th ,,	,, ,,	40·	40·
19th ,,	,, few	40·3	40·7
20th ,,	,, ,,	40·4	40·6
21st ,,	,, ,,	40·2	39·8
22nd ,,	,, ,,	40·	40·4
23rd ,,	,, ,,	40·2	40·6
24th ,,	,, ,,	40·5	40·9
25th ,,	,, absent	40·1	40·4
26th ,,	,, ,,	40·1	40·3
27th ,,	,, ,,	40·2	40·6
28th ,,	,, ,,	40·4	40·5
29th ,,	,, ,,	40·	40·4
30th ,,	,, ,,	40·3	40·6
1st October	,, ,,	40·5	40·2
2nd ,,	,, ,,	40·	40·5
3rd ,,	,, ,,	40·3	40·2
4th ,,	,, ,,	40·2	40·3
5th ,,	,, ,,	40·	40·3
6th ,,	,, ,,	40·2	40·5
7th ,,	,, ,,	40·5	40·8
8th ,,	,, ,,	40·2	40·5
9th ,,	,, ,,	40·2	40·6
10th ,,	,, ,,	40.2	40·5
11th ,,	,, ,,	40.1	40·2
12th ,,	,, ,,	40·4	40·1
13th ,,	,, few	40·5	40·7
14th ,,	,, ,,	40·5	40·6
15th ,,	,, absent	40·1	41·0
16th ,,	,, ,,	40·1	40·4
17th ,,	,, ,,	39·7	40·
18th ,,	,, ,,	40·	40·3
19th ,,	,, ,,	40·	40·2
20th ,,	,, ,,	40·1	40·3
21st ,,	,, ,,	40·	40·2
22nd ,,	,, ,,	40·5	40·4
23rd ,,	,, ,,	40·3	40·4
24th ,,	,, ,,	40·	40·4
25th ,,	,, ,,	39·7	40·1
26th ,,	,, ,,	39·6	40·1
27th ,,	,, ,,	40·4	40·7
28th ,,	,, ,,	39·8	40·6
29th ,,	,, ,,	40·	40·2
30th ,,	,, ,,	40·3	40·6
31st ,,	,, ,,	40·4	40·6
1st November	,, ,,	40·	40·1
2nd ,,	,, ,,	39·4	40·
3rd ,,	,, ,,	39·6	39·8
4th ,,	,, ,,	39·1	40·4
5th ,,	,, ,,	39·4	40·2
6th ,,	,, ,,	39·3	38·1
7th ,,	,, ,,	35·2	35·
8th ,,	,, ,,	Death.	

June 17th, 1891. This animal was inoculated subcutaneously with 0·2 c.c. of Bull's blood.

Inoculated on the 17th June 1891.

Died on the 8th November 1891, early morning.

AUTOPSY.—Body emaciated.

Pleural cavities free.

Lungs.—Apices seat of localized emphysema.

Right upper lobe, consolidated below upper ⅓. Left free from pneumonic process.

Stomach.—Presents no lesion.

Heart.—Apparently healthy.

Spleen.—Five times normal size.

Liver.—Normal. Kidneys normal.

GUINEA-PIG No. II.

Month and Date.	Examination of blood.	Temperature °C.	
		A. M.	P. M.
1891			
15th June	......	...	38·9
16th ,,	......	38·8	39·1
17th ,,	Inoculated with 0·2 c. c. of bull's blood.	38·7	40·2
18th ,,	......	40·4	40·5
19th ,,	Enlarged glands at seat of inoculation.	40·3	40·7
20th ,,	Glands increased in size.	40·3	41·0
21st ,,	......	40·8	38·4
22nd ,,	Glands enlarged	38·5	39·0
23rd ,,	,, ,,	39·3	39·4
24th ,,	Hæmatozoa absent	39·4	39·7
25th ,,	,, absent	39·2	39·3
26th ,,	,, ,,	39·3	40·0
27th ,,	,, ,,	38·6	39·7
28th ,,	,, ,,	39·1	39·8
29th ,,	,, ,,	39·4	40·5
30th ,,	,, ,,	39 8	39·8
1st July	,, ,,	39·4	39·8
2nd ,,	,, ,,	39·3	40·8
3rd ,,	,, ,,	40·4	40·5
4th ,,	,, ,,	40·1	40·7
5th ,,	,, few	39·1	39·4
6th ,,	,, absent.	39·3	39·2
7th ,,	,, few	39·5	39·6
8th ,,	,, ,,	39·1	39·4
9th ,,	,, numerous.	39 1	39·7
10th ,,	,, ,,	38·7	39·2
11th ,,	,, ,,	38·6	39·8
12th ,,	,, ,,	39·1	40·0
13th ,,	,, ,,	39·0	40·2
14th ,,	,, ,,	40·1	39·4
15th ,,	,, ,,	39·0	39·4
16th ,,	,, ,,	39·0	39·6
17th ,,	,, ,,	39·1	39·7
18th ,,	,, ,,	39·3	39·8
19th ,,	,, ,, very numerous.	39·4	39·6
20th ,,	,, ,,	39·5	39·6
21st ,,	,, ,,	39·1	39·8
22nd ,,	,, ,,	39·8	40·1
23rd ,,	,, ,,	39·7	39·7
24th ,,	,, ,,	39·7	39·5
25th ,,	,, swarming	39·3	39·6
26th ,,	,, ,,	39·2	39·7
27th ,,	,, very numerous	39·4	39·6
28th ,,	,, ,, ,,	39·0	39·5
29th ,,	,, swarming.	39·4	39·6
30th ,,	,, ,,	39·5	39·6
31st ,,	,, ,,	39·3	39·6
1st August	,, ,,	39·5	39·6
2nd ,,	,, ,, ,,	39·4	39·7
3rd ,,	,, very numerous	39·4	40·2
4th ,,	,, ,, ,,	40·0	39·8
5th ,,	,, ,, ,,	39·5	39·8
6th ,,	,, ,, ,,	39·4	39·6
7th ,,	,, ,, ,,	39 4	39·8
8th ,,	,, ,, ,,	39·7	39·8
9th ,,	,, numerous	39·7	40·0
10th ,,	,, ,,	39·8	39·6
11th ,,	,, ,,	39·5	39·7
12th ,,	,, ,,	39·5	39·6
13th August	Hæmatozoa numerous.	39·4	39·7
14th ,,	,, ,,	39·4	39·8
15th ,,	,, ,,	39·5	39·7
16th ,,	,, ,,	39·5	39·6
17th ,,	,, very ,,	39·4	39·7
18th ,,	,, ,,	40·0	40·1
19th ,,	,, ,, ,,	40·6	40·0
20th ,,	,, ,, ,,	39·7	39·8
21st ,,	,, ,, ,,	39·6	39·7
22nd ,,	,, ,, ,,	39·5	40·0
23rd ,,	,, ,, ,,	39·7	39·8
24th ,,	,, swarming	39 7	39·6
25th ,,	,, ,,	39·4	39·8
26th ,,	,, very numerous.	39·6	39·8
27th ,,	,, ,, ,,	39·5	39·6
28th ,,	,, ,, ,,	39·4	39·5
29th ,,	,, ,, ,,	39·4	39·6
30th ,,	,, ,, ,,	39·4	39·5
31st ,,	,, ,, ,,	39·4	39·5
1st September	,, swarming	39·3	40·1
2nd ,,	,, ,,	39·6	39·7
3rd ,,	,, numerous	40·3	39·7
4th ,,	,, absent	39·8	39·6
5th ,,	,, ,,	39·3	39·6
6th ,,	,, ,,	39·4	39·5
7th ,,	,, ,,	39·8	39·7
8th ,,	,, few	39·5	39·8
9th ,,	,, numerous	40·6	39·7
10th ,,	,, few	39·6	39·8
11th ,,	,, absent	40·4	40·1
12th ,,	,, ,,	39·5	40·2
13th ,,	,, ,,	39·6	39·7
14th ,,	,, few	39·5	40·0
15th ,,	,, ,,	39·4	40·2
16th ,,	,, numerous	40·0	40·3
17th ,,	,, numerous	40·2	40·5
18th ,,	,, few	40·7	40·6
19th ,,	,, absent	40·1	40·3
20th ,,	,, ,,	39·7	40·4
21st ,,	,, few	40·1	40·0
22nd ,,	,, ,,	40·1	40·8
23rd ,,	,, absent	40·3	40·4
24th ,,	,, ,,	40·5	40·9
25th ,,	,, ,,	40·8	40·6
26th ,,	,, ,,	40·4	40·5
27th ,,	,, ,,	40·4	40·4
28th ,,	,, ,,	40·5	40·7
29th ,,	,, ,,	40·2	40·6
30th ,,	,, ,,	40·4	40·7
1st October	,, ,,	40·5	40·0
2nd ,,	,, ,,	39·3	39·4
3rd ,,	,, ,,	40·8	40·8
4th ,,	,, ,,	40·3	40·6
5th ,,	,, ,,	39·8	40·1
6th ,,	,, ,,	40·4	41·0
7th ,,	,, ,,	40·2	40·5
8th ,,	,, ,,	40·3	40·6
9th ,,	,, ,,	40·2	40·7
10th ,,	,, ,,	40·0	40·0
11th ,,	,, ,,	39·6	40·6
12th ,,	......	35·0	Death.

Guinea-Pig inoculated with 0·2 c. c. of Bull's blood on 17th June 1891.

Died, 12th October 1891, at 10-30 A.M.

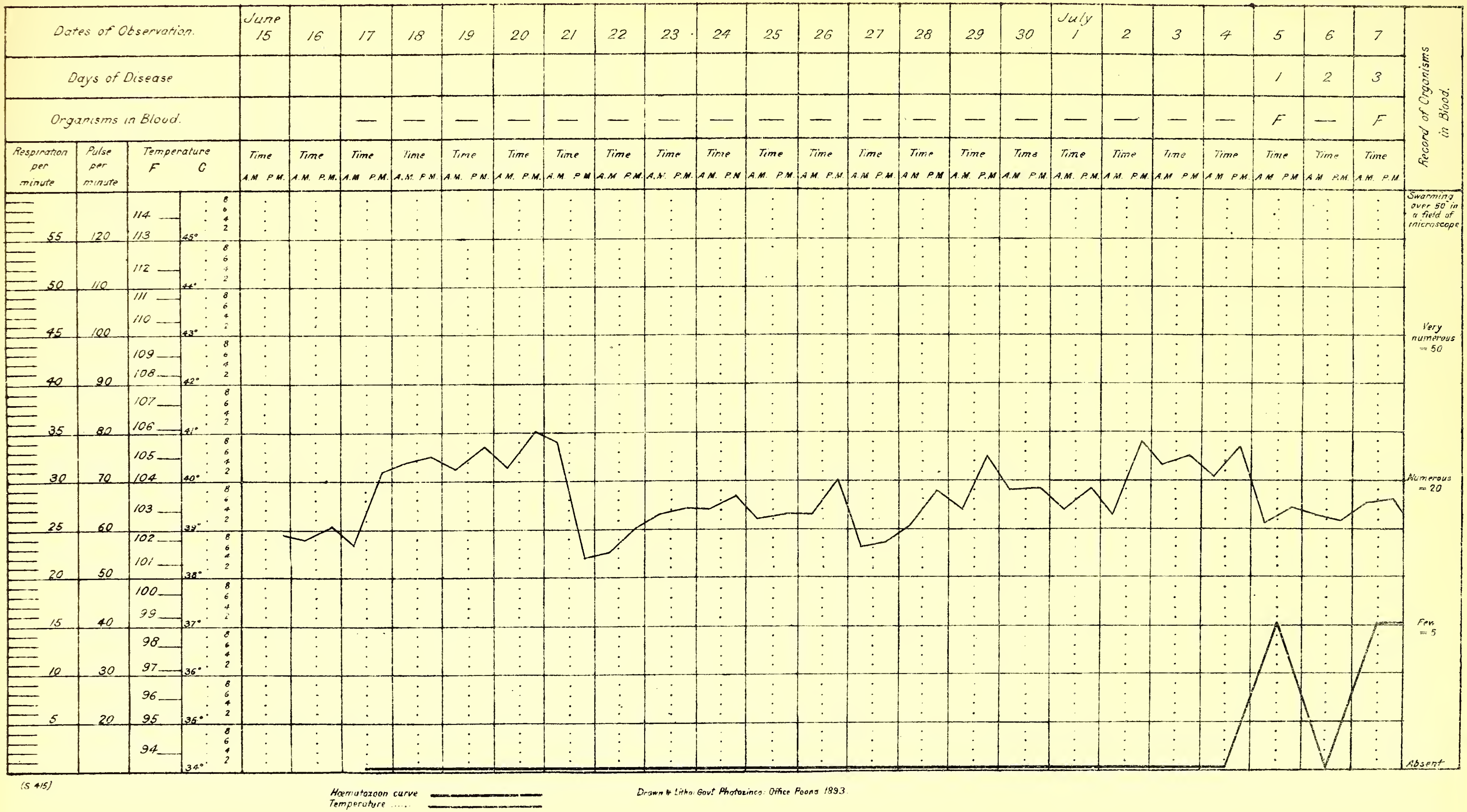
AUTOPSY.—Body emaciated. Rigor mortis has not yet supervened.

Cavity of Chest.—Pleural cavities both full of pus with some flakes of lymph adhering to the parietal pleura on the left side.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

G. P. 2 Subcutaneous Inoculation with 0·2 cc of blood from Bull I on the 85th day ______ Age ______ Sex ______ Colour ______

Disease "Surra" ______ Date of Inoculation 17th June 91 ______ Result Death ______ Date of Result 12·10·91 ______ Register No. II ______



(S 415)

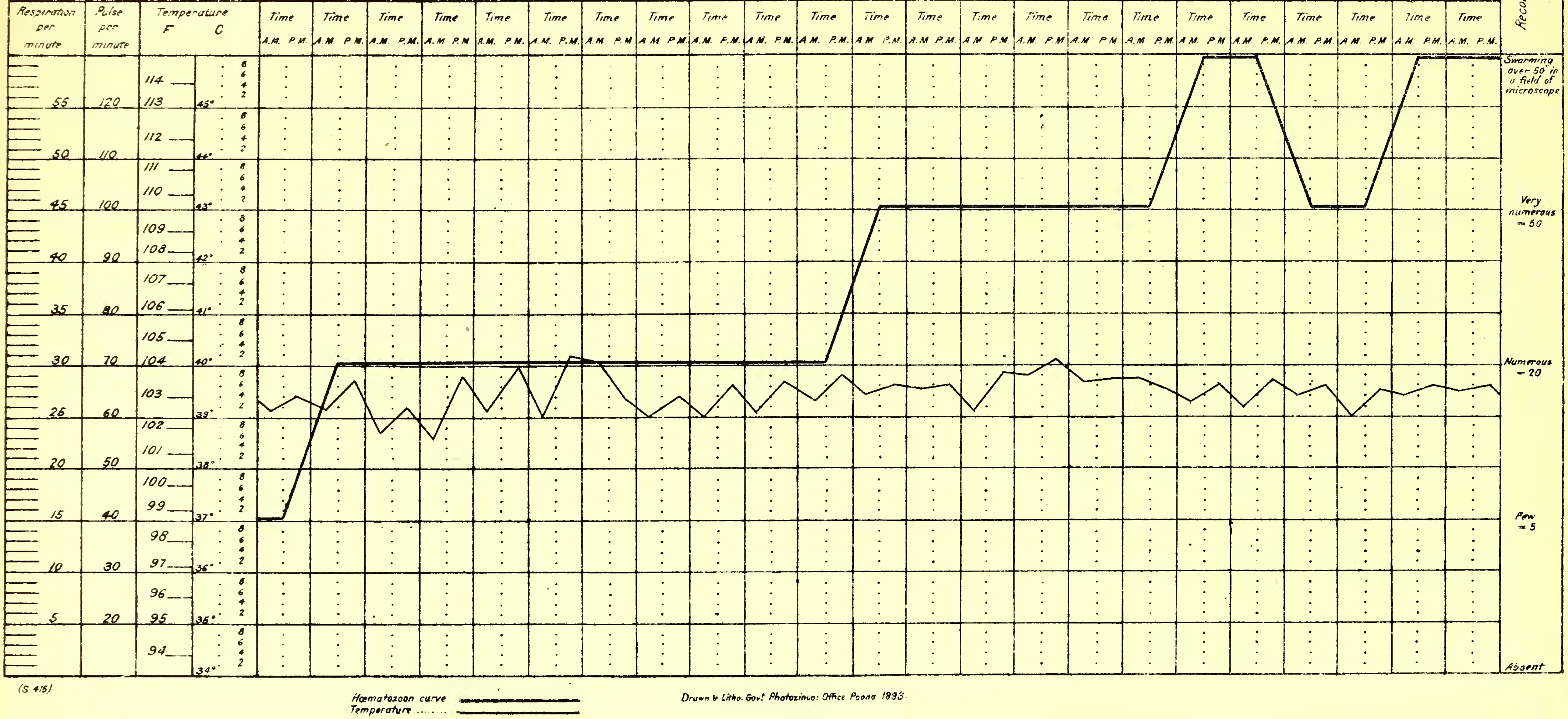
Drawn & Litho: Govt Photozinco: Office Poona 1893.

Age ______ Sex ______ Colour

Age Sex Colour

Disease Date of Result Date of Result Register No. II.

Dates of Observation.	July 8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Days of Disease	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Organisms in Blood	F	N	N	N	N	N	N	N	N	N	N	VN	VN	VN	VN	VN	VN	S	S	VN	VN	S	S



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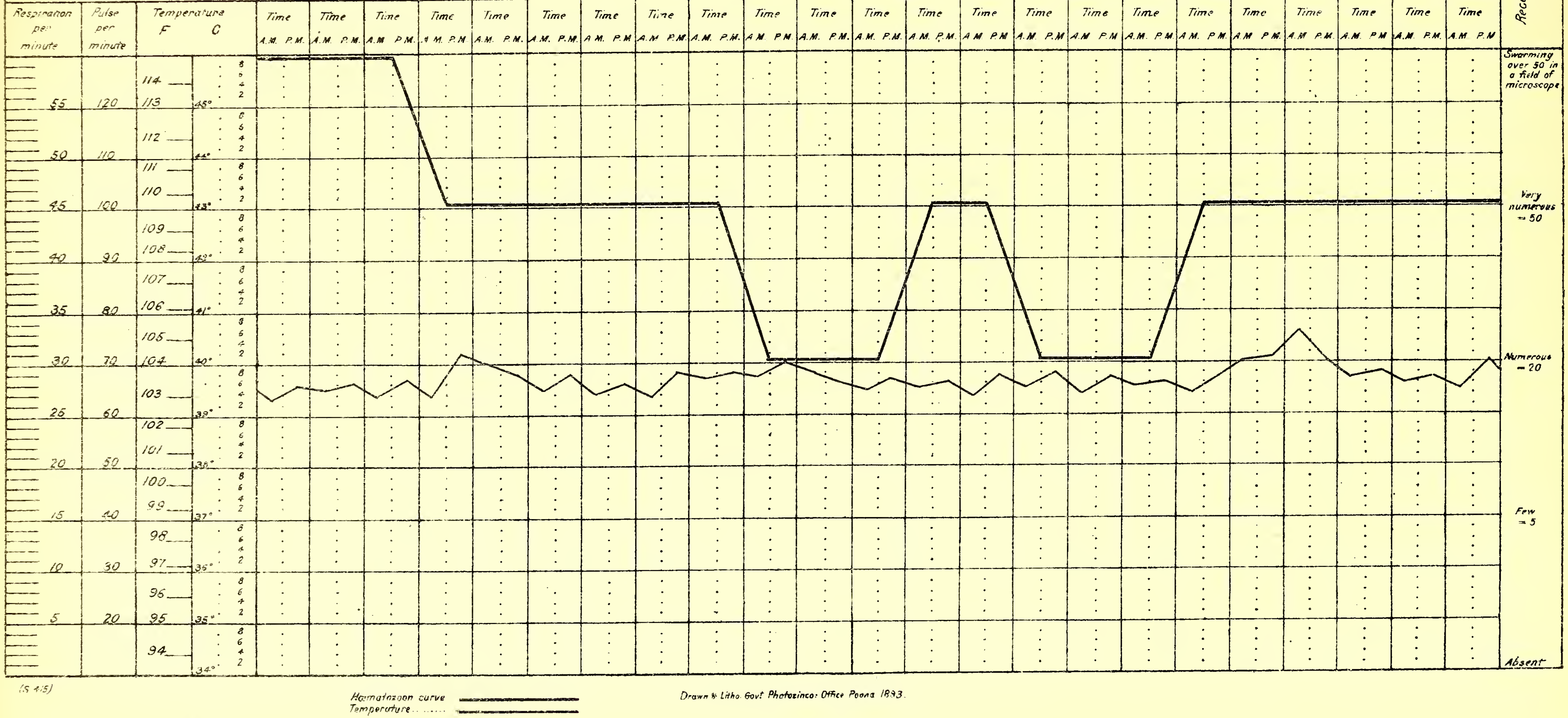
Drawn & Litho. Govt. Photozinco: Office Poona 1893.

Age ______ Sex ______ Colour ______

Disease ______ Date of ______ Result ______ Date of Result ______ Register No. II.

Dates of Observation	July 31	August 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Days of Disease	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49
Organisms in Blood.	S	S	S	VN	VN	VN	VN	VN	VN	N	N	N	VN	VN	N	N	N	VN	VN	VN	VN	VN	VN



(S 415)

Drawn & Litho. Govt. Photozinco: Office Poona 1893.

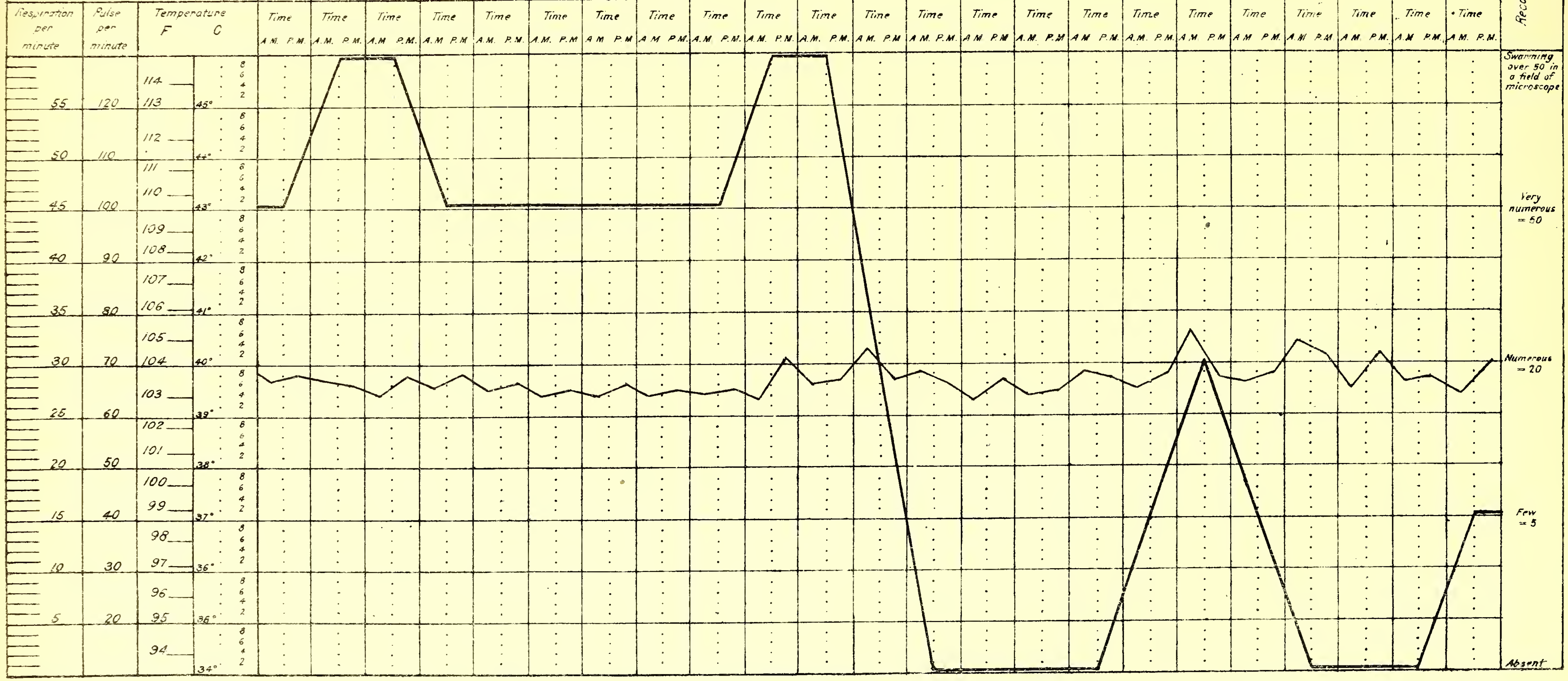
Age ——— Sex ——— Colour ———

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age ______ Sex ______ Colour ______

Disease ______ Date of ______ Result ______ Date of Result ______ Register No. II

Dates of Observation.	Augt 23	24	25	26	27	28	29	30	31	Sept 1	2	3	4	5	6	7	8	9	10	11	12	13	14
Days of Disease	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
Organisms in Blood.	VN	S	S	VN	VN	VN	VN	VN	VN	S	S	N	—	—	—	—	F	N	F	—	—	—	F



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Hæmatozoon curve
Temperature ......

Drawn & Litho. Govt. Photozinco: Office Poona 1893.

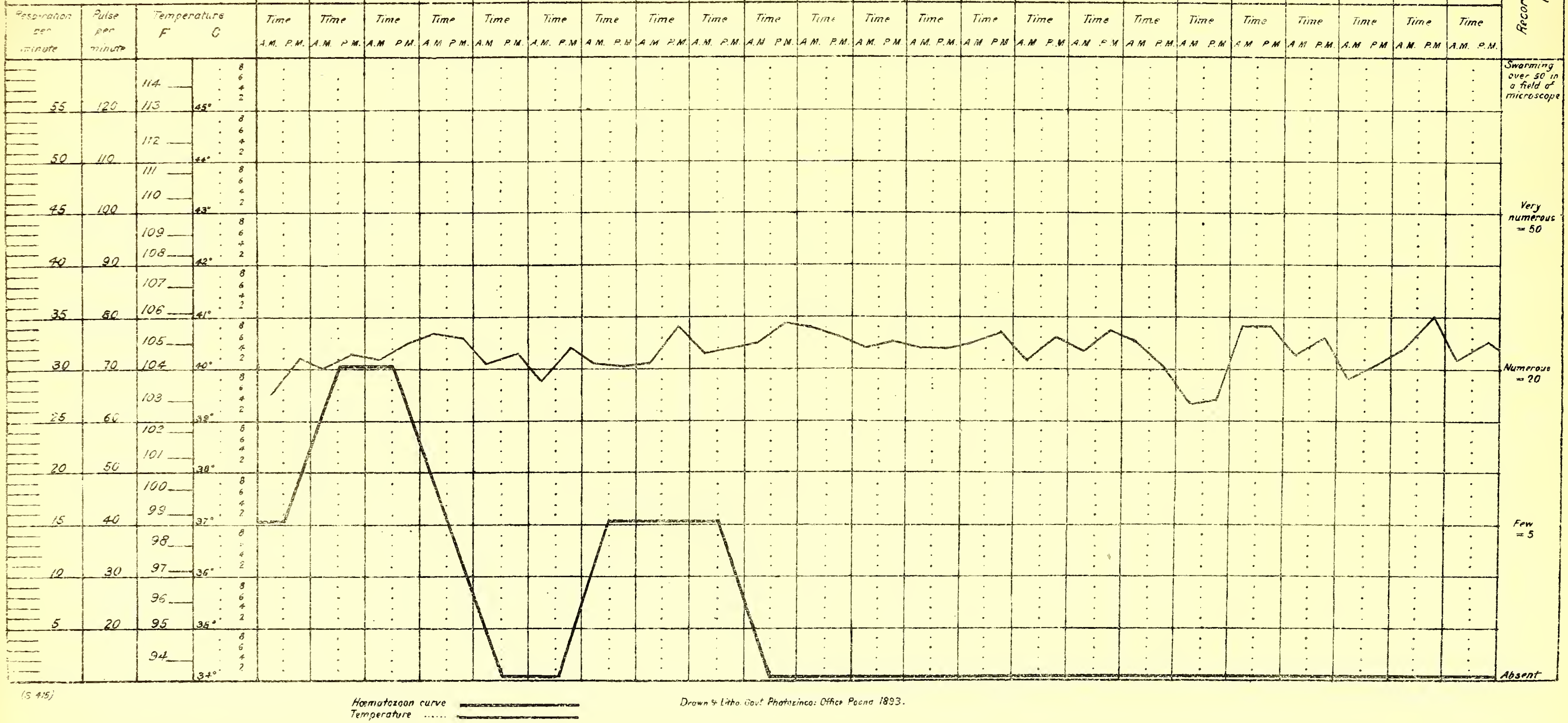
Age ______ Sex ______ Colour

RECORDS OF TEMPERATURE PULSE AND RESPIRATION

Age ______ Sex ______ Colour ______

Disease ______ Date of ______ Result ______ Date of Result ______ Register No. ______

Dates of Observation	Sept.r 15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Oct.r 1.	2	3	4	5	6	7
Days of Disease	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95
Organisms in Blood	F	N	N	F	—	—	F	F	F	—	—	—	—	—	—	—	—	—	—	—	—	—	—



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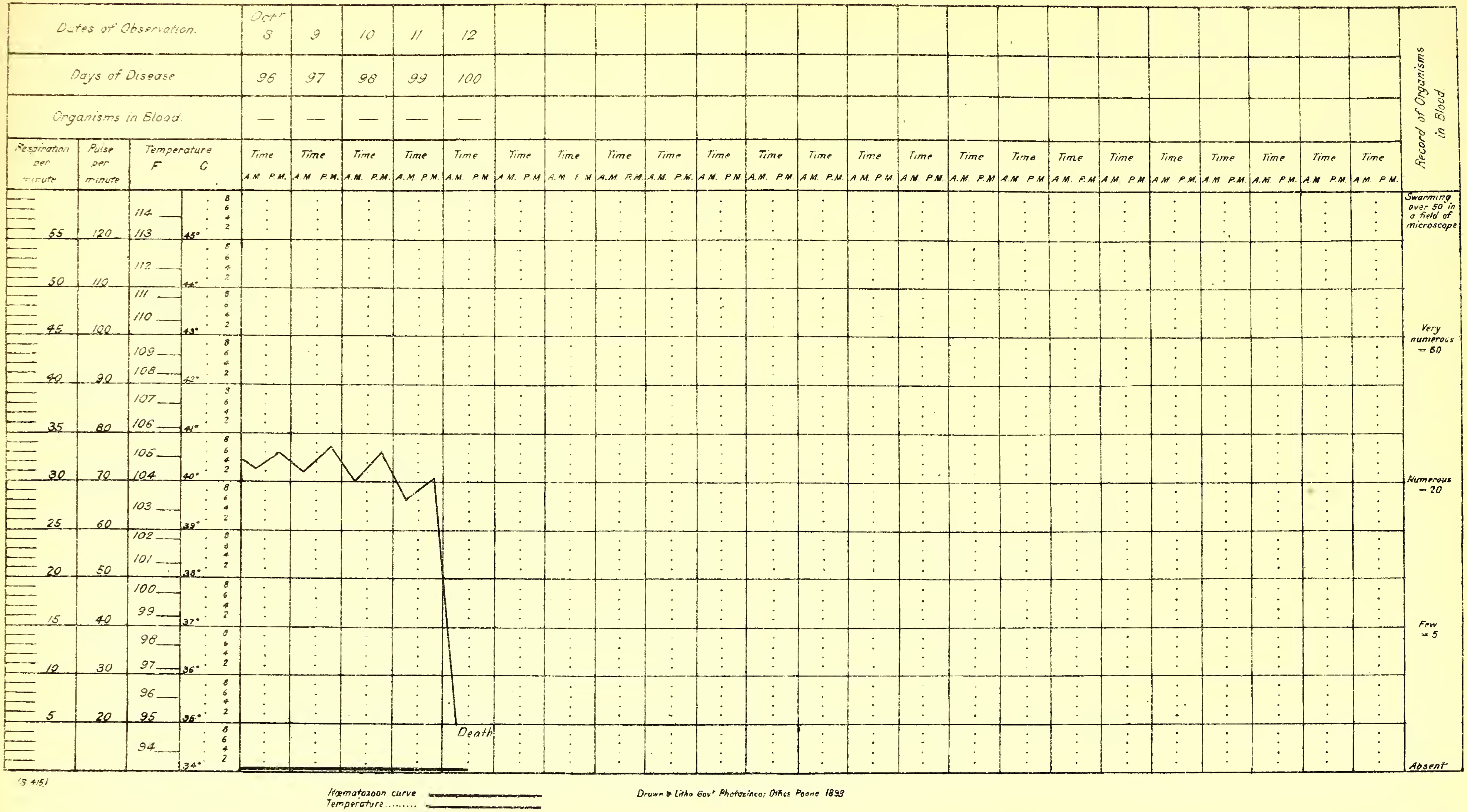
RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age ____ Sex ____ Colour ____

Disease ____ Date of ____ Result ____ Date of Result ____ Register No ____



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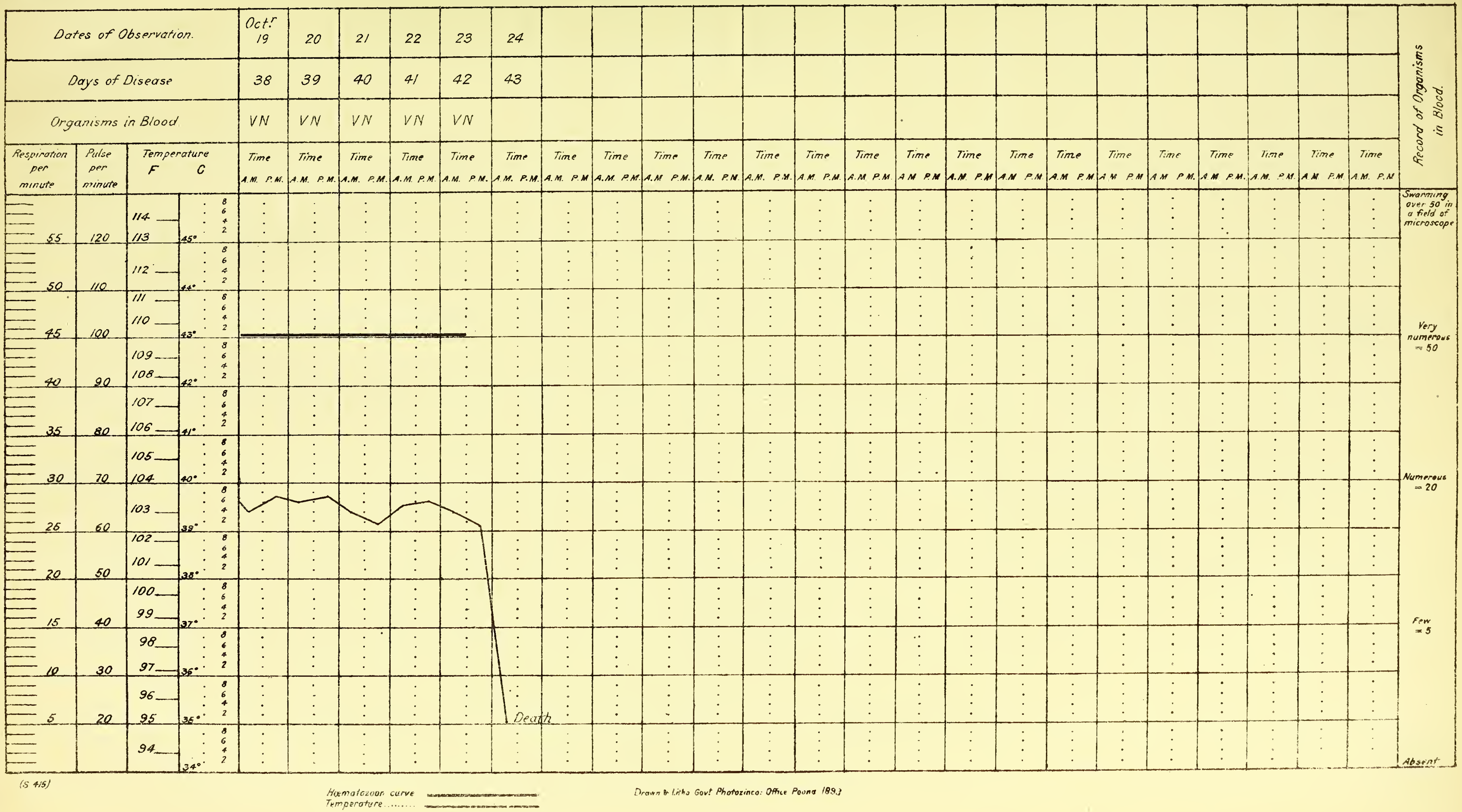
Drawn & Litho Govt Photozinco: Office Poona 1899

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age ________ Sex ________ Colour ________

Disease ________ Date of ________ Result ________ Date of Result ________ Register No. ________

Dates of Observation.	Oct.r 19	20	21	22	23	24
Days of Disease	38	39	40	41	42	43
Organisms in Blood	VN	VN	VN	VN	VN	



(S 415)

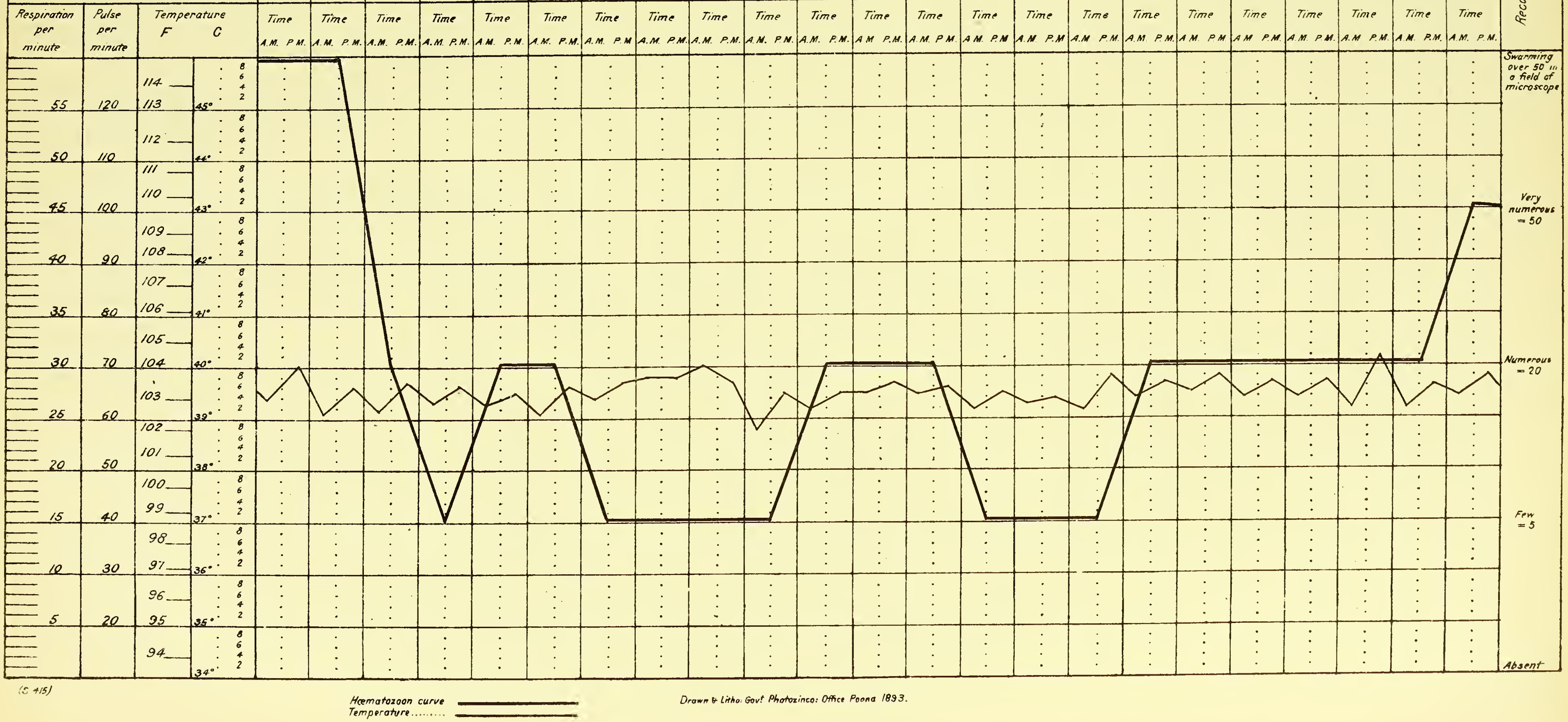
Drawn & Litho Govt Photozinco: Office Poona 1893

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

__________ Age ______ Sex ______ Colour ______

Disease ______ Date of ______ Result ______ Date of Result ______ Register No. ______

Dates of Observation.	Sept.r 26	27	28	29	30	Oct.r 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Days of Disease	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37
Organisms in Blood.	S	S	N	F	N	N	F	F	F	F	N	N	N	F	F	F	N	N	N	N	N	N	VN



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Drawn & Litho: Gov.t Photozinco: Office Poona 1893.

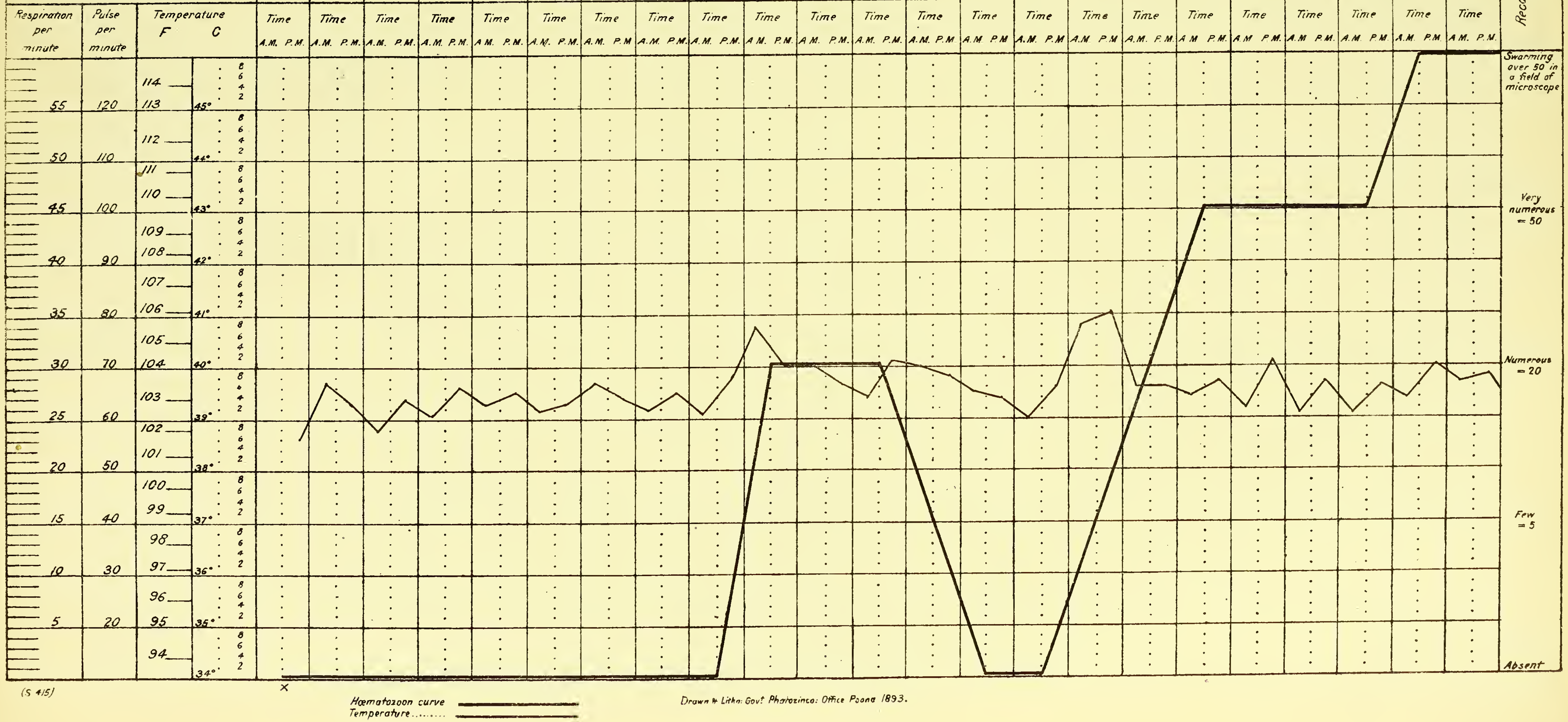
Chart I.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

G. P. II. Subcutaneously Inoculated with 0·2cc of blood from Bull I on the 163rd day after injection of the latter — Age ______ Sex ______ Colour ______

Disease "Surra" ______ Date of Inoculation, 3. September 1891. Result, Death. ______ Date of Result, 24.10.91. Register No. III. ______

Dates of Observation.	Septr 3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Days of Disease										1	2	3	4	5	6	7	18	9	10	11	12	13	14
Organisms in Blood	—	—	—	—	—	—	—	—	—	N	N	N	F	—	—	F	N	VN	VN	VN	VN	S	S



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Drawn & Lithd: Govt Photozinco: Office Poona 1893.

Right Lung.—Anterior lobe and anterior half of inferior, dark red in colour, solid, and sinks in water; the seat of pneumonia. Inferior half of lower lobe normal in colour and distended with air.

Left Lung.—Right half of anterior lobe solid, dark red and pneumonic. Left or internal half normal in colour; admits air. Posterior lobe normal in colour and admits air freely.

Heart.—Apparently healthy.

Spleen.—Three times normal size.

Liver.—Normal.

Kidneys.—Normal.

GUINEA-PIG No. III.

Month and Date.	Examination of blood.	Temperature °C.		Month and Date.	Examination of blood.	Temperature °C.	
		A. M.	P. M.			A. M.	P. M.
1891				September.			
September.				29th ..	Hæmatozoa few ...	39·3	39·6
3rd...	Inoculation	...	38·6	30th...	,, numerous ...	39·3	39·5
4th...	Hæmatozoa absent ...	39·7	39·3	October.			
5th...	,, ,, ...	38·8	39·4	1st ...	,, ,, ...	39·1	39·6
6th...	,, ,, ...	39·1	39·6	2nd...	,, few ...	39·4	39·7
7th...	,, ,, ...	39·3	39·5	3rd...	,, ,, ...	39·8	39·8
8th...	,, ,, ...	39·2	39·3	4th...	,, ,, ...	40·	39·7
9th...	,, ,, ...	39·7	39·4	5th...	,, ,, ...	38·8	39·5
10th...	,, ,, ...	39·2	39·5	6th...	,, numerous ...	39·2	39·5
11th...	,, ,, ...	39·1	39·8	7th...	,, ,, ...	39·5	39·7
12th...	,, numerous ...	40·8	40·	8th. .	,, ,, ...	39·5	39·6
13th...	,, ,, ...	40·	39·7	9th...	,, few ...	39·2	39·5
14th...	,, ,, ...	39·4	40·1	10th...	,, ,, ...	39·3	39·4
15th...	,, few ...	40·	39·8	11th .	,, ,, ...	39·2	39·8
16th...	,, absent ..	39·5	39·4	12th...	,, numerous ...	39·4	39·7
17th...	,, ,, ...	39·	39·6	13th...	,, ,, ...	39·5	39·8
18th...	,, few ...	40·8	41·	14th...	,, ,, ...	39·4	39·7
19th...	,, numerous ...	39·6	39·6	15th...	,, ,, ...	39·4	39·7
20th...	,, very numerous.	39·4	39·7	16th...	,, ,, ...	39·2	40·2
21st ...	,, ,, ...	39·2	40·1	17th .	,, ,, ..	39·2	39·6
22nd...	,, ,, ...	39·1	39·7	18th...	,, very numerous.	39·4	39·8
23rd...	,, ,, ...	39·1	39·6	19th...	,, ,, ..	39·4	39·7
24th...	,, swarming ...	39·4	40·	20th...	,, ,, ...	39·6	39·7
25th...	,, ,, ...	39·7	39·8	21st ..	,, ,, ...	39·4	39·2
26th...	,, ,, ...	39·4	40·	22nd...	,, ,, ...	39·5	39·6
27th...	,, ,, ...	39·1	39·6	23rd ..	,, ,, ...	39·4	39·
28th...	,, numerous ...	39·2	39·7	24th...	,, ,, ...	35·	Death.

September 3rd, 1891.—This animal was inoculated subcutaneously with 0·2 c.c. of Bull's blood.

GUINEA-PIG No. IV.

Month and Date.	Examination of blood.	Temperature °C.		Month and Date.	Examination of blood.	Temperature °C.	
		A. M.	P. M.			A. M.	P. M.
1891							
September.							
3rd...	Inoculation	...	38·7	October.			
4th...	Hæmatozoa absent ...	38·4	38·8	1st ...	Hæmatozoa very numerous	39·5	39·2
5th...	,, ,, ...	38·6	39·3	2nd...	,, ,, ...	39·6	39·4
6th...	,, ,, ...	39·2	39·2	3rd...	,, swarming ...	39·2	39·3
7th...	,, ,, ...	38·8	39·3	4th...	,, ,, ...	39·3	39·5
8th..	,, ,, ...	39·	39·2	5th...	,, ,, ...	39·2	39·4
9th..	,, ,, ...	38·5	39·3	6th...	,, very numerous.	39·	39·5
10th...	,, ,, ...	39·	39·3	7th...	,, ,, ...	39·3	39·4
11th...	,, ,, ...	39·	39·8	8th...	,, ,, ...	38·8	39·5
12th...	,, numerous ...	40·7	39·8	9th...	,, ,, ...	39·	39·6
13th...	,, ,, ...	40·1	40·	10th...	,, ,, ...	39·1	39·5
14th...	,, few ...	39·7	39·7	11th...	,, numerous ...	39·1	39·6
15th...	,, ,, ...	39·5	39·4	12th...	,, few ...	39·3	39·3
16th...	,, absent	39·7	39·3	13th..	,, numerous ...	39·2	39·5
17th...	,, ,, ...	39·7	39·3	14th...	,, ,, ...	39·3	39·6
18th...	,, few ...	39·7	40·4	15th...	,, very numerous.	39·4	39·5
19th...	,, numerous ...	39·1	39·4	16th...	,, absent ...	39·6	40·
20th...	,, ,, ...	39·1	39·5	17th..	,, ,, ...	39·1	39·4
21st ...	,, ,, ...	39·3	39·4	18th...	,, ,, ...	39·4	39·6
22nd...	,, ,, ...	39·4	39·6	19th..	,, ,, ...	39·5	39·8
23rd...	,, very numerous.	39·	39·6	20th...	,, ,, ...	39·5	39·6
24th...	,, ,, ...	39·3	39·7	21st ...	,, ,, ...	39·4	39·4
25th...	,, few ...	39·2	39·7	22nd...	,, ,, ...	39·3	39·7
26th...	,, numerous ...	39·3	39·8	23rd ..	,, ,, ...	39·5	39·6
27th ..	,, ,, ...	39·4	39·5	24th...	,, ,, ...	39·3	39·7
28th...	,, very numerous.	39·	39·3	25th...	,, ,, ...	39·	39·4
29th...	,, ,, ...	39·1	39·2	26th...	,, numerous ...	39·2	40·4
30th...	,, ,, ...	39·	39·3				

Month and Date.	Examination of blood.	Temperature °C.		Month and Date.	Examination of blood.	Temperature °C.	
		A. M.	P. M.			A. M.	P. M.
1891.				November.			
October.	Hæmatozoa few ...			20th...	Hæmatozoa few ...	40·	39·6
27th...	,, absent ...	39·4	39·6	21st...	,, ,, ...	40·3	40·2
28th...	,, ,, ...	39·4	39·4	22nd,,,	,, ,, ...	39·6	39·8
29th...	,, ,, ..	39·1	39·5	23rd...	,, ,, ...	39·2	39·6
30th..	,, few ...	39·	39·7	24th...		40·	39·8
31st ...		39·2	39·6	25th...	,, ,, ...	39·4	39·7
November.	,, numerous ...			26th...	,, ,, ...	39·5	39·6
1st...	,, very numerous.	39·2	39·7	27th...	,, ,, ..	39·3	40·
2nd...	,, ,, ...	39·5	39·8	28th...	,, ,, ...	39·8	40·3
3rd...	,, ,, ...	39·4	39·4	29th...	,, ,, ...	40·1	40·2
4th...	,, numerous ...	39·5	39·8	30th...	,, ,, ..	40·	40·1
5th...	,, few ...	39·6	40·	December.			
6th...	,, absent ...	39·5	40·1	1st...	,, ,, ...	39·5	40·3
7th...	,, ,, ...	39·4	40·	2nd...	,, ,, ...	39·5	40·1
8th...	,, ,, ...	39·6	40·1	3rd...	,, ,, ...	39·6	40·4
9th ..	,, ,, ...	40·	40·2	4th...	,, ,, ...	39·8	40·3
10th...	,, ,, ...	40·	40·5	5th...	,, ,, ...	39·7	40·1
11th...	,, ,, ...	40·2	40·4	6th...	,, ,, ...	39·6	40·3
12th...	,, few ...	39·6	39·8	7th...	,, ,, ...	39·5	39·7
13th...	,, ,, ...	39·2	39·7	8th...	,, ,, ...	38·6	40·2
14th...	,, ,, ...	39·5	39·6	9th...	,, ,, ...	40·2	40·4
15th...	,, ,, ...	39·7	39·8	10th...	,, ,, ..	39·3	40·3
16th...	,, ,, ...	40·	40·2	11th...	,, ,, ...	38·4	40·2
17th...	,, ,, ...	40·	40·1	12th...	,, ,, ...	38·5	40·3
18th...	,, ,, ...	39·4	39·7	13th...	,, ,, ...	39·6	40·2
19th...	,, ,, ...	39·4	39·3	14th...	,, ,, ...	39·5	Death.

September 3rd, 1891.—This animal was inoculated with 0·2 c.c. of blood taken from the Bull.

GUINEA-PIGS Nos. V and VI.—These animals were inoculated subcutaneously with 0·2c.c. of blood taken from the Bull.

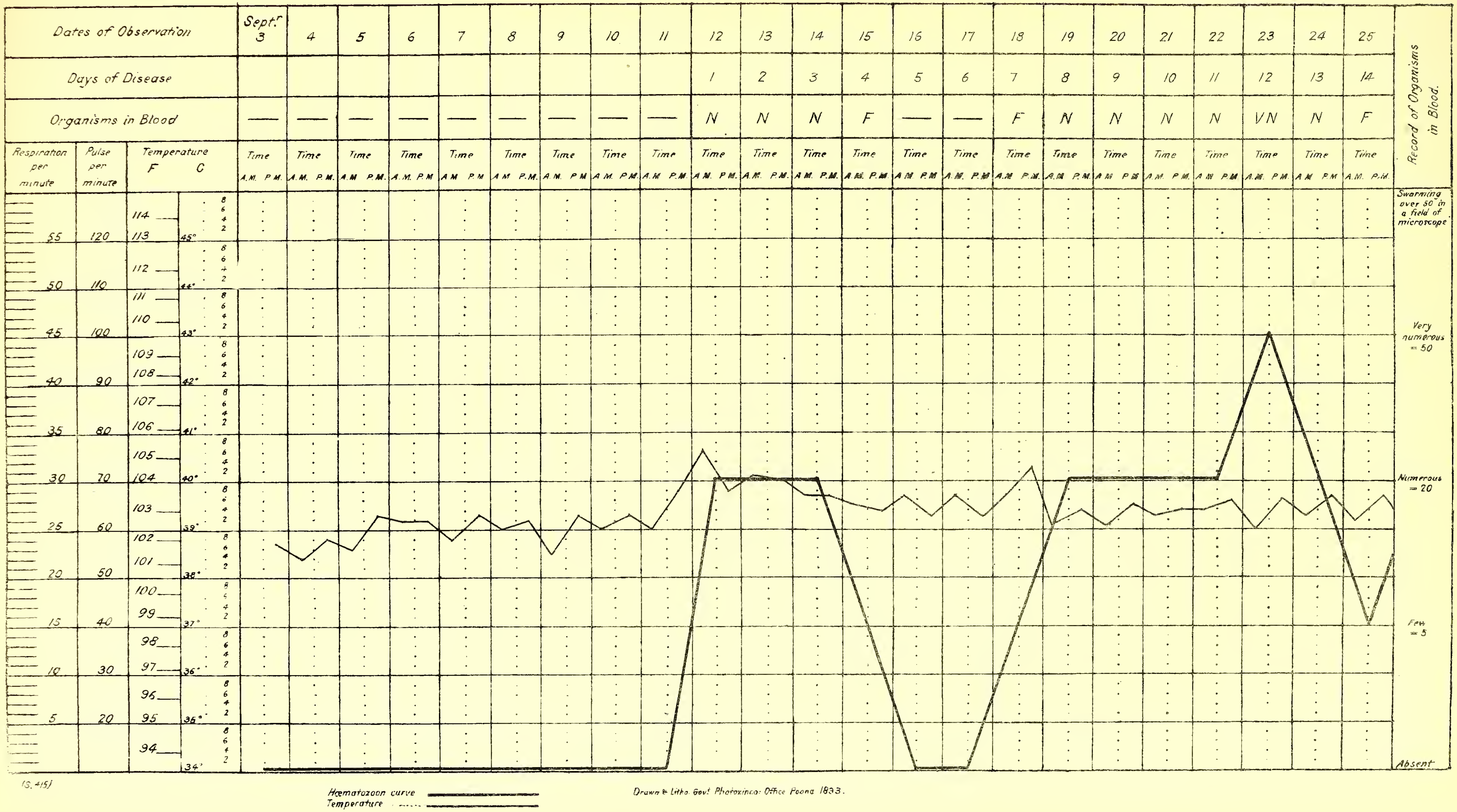
Month and Date.	No. V Guinea-Pig.	Temperature °C.		No. VI Guinea-Pig.	Temperature °C.	
		A. M.	P. M.		A. M.	P. M.
1891.						
November						
13th...	Inoculated with 0·2c.c.			Inoculated with 0·2c.c.		
14th...	Hæmatozoa absent from the blood.	...	39·2	Hæmatozoa absent from the blood.	...	39·
15th ..	,, ,, ...	37·5	39·3	,, ,, ...	37·2	39·1
16th...	,, ,, ...	38·7	39·2	,, ,, ...	38·8	39·
17th...	,, ,, ...	38·4	39·		38·0	38·8
18th...	,, ,, ...	38·4	39·5	,, ,, ...	38·7	39·3
19th...	,, ,, ...	38·	39·6	,, ,, ...	38·3	39·3
20th...	,, ,, ..	38·3	39·2	,, ,, ...	38·8	39·2
21st ...	,, ,, ...	38·1	39·3	,, ,, ...	38·7	39·2
22nd...	,, ,, ...	38·5	39·7	,, ,, ...	39·1	39·3
23rd...	,, ,, ...	38·1	39·4	,, ,, ...	38·2	39·5
24th...	,, ,, ...	38·7	39·3	,, ,, ...	38·4	39·4
25th...	,, ,, ..	38·5	39·4	,, ,, ...	38·7	39·2
26th...	,, ,, ...	38·5	39·2	,, ,, ...	38·4	39·2
27th...	,, ,, ...	38·2	39·5	,, ,, ...	38·6	39·
28th...	,, ,, ...	38·6	39·6	,, ,, ...	38·5	39·4
29th...	,, ,, ...	38·5	39·5	,, ,, ...	38·6	39·3
30th...	,, ,, ...	39·	39·4	,, ,, ...	39·4	39·3
December						
1st ...	,, ,, ...	39·2	39·3	,, ,, ...	39·3	39·5
2nd...	,, ,, ...	39·2	39·1	,, ,, ...	39·	39·4
3rd...	,, ,, ...	38·3	39·2	,, ,, ...	38·5	39·4
4th...	,, ,, ...	38·6	39·3	,, ,, ...	38·5	39·3
5th...	,, ,, ...	38·5	39·3	,, ,, ...	38·4	39·2
6th...	,, ,, ...	38·4	39·2	,, ,, ...	38·5	39·3
7th...	,, ,, ...	38·5	39·4	,, ,, ...	39·	39·4
8th...	,, ,, ...	39·1	39·4	,, ,, ...	39·2	39·2
9th ..	,, ,, ...	38·6	39·3	,, ,, ...	39·1	39·2
10th...	,, ,, ...	38·6	39·2	,, ,, ...	38·4	39·2
11th...	,, ,, ...	38·5	39·3	,, ,, ...	38·6	39·1
12th...	,, ,, ...	38·4	39·2	,, ,, ...	38·6	39·6
13th...	,, ,, ...	38·7	39·5	,, ,, ...	38·4	39·4
14th...	,, ,, ...	38·5	39·4	,, ,, ...	38·5	39·5
15th...	,, ,, ...	38·8	39·5	,, ,, ...	39·2	39·6
	Result negative			*Result negative*		

December 16th, 1891.—These two animals were re-inoculated with 0·2.c.c of blood taken from the Bull on the 267th day after the latter's inoculation. The results were, however, again of a negative character.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

G. P. 4 Subcutaneously Inoculated with 0·2cc of blood from Bull I on the 163rd day Age Sex Colour

Disease "Surra" Date of Inoculation, 3. September 1891. Result, Death Date of Result, 23.12.91. Register No. IV.



Drawn & Litho. Govt. Photozinco: Office Poona 1893.

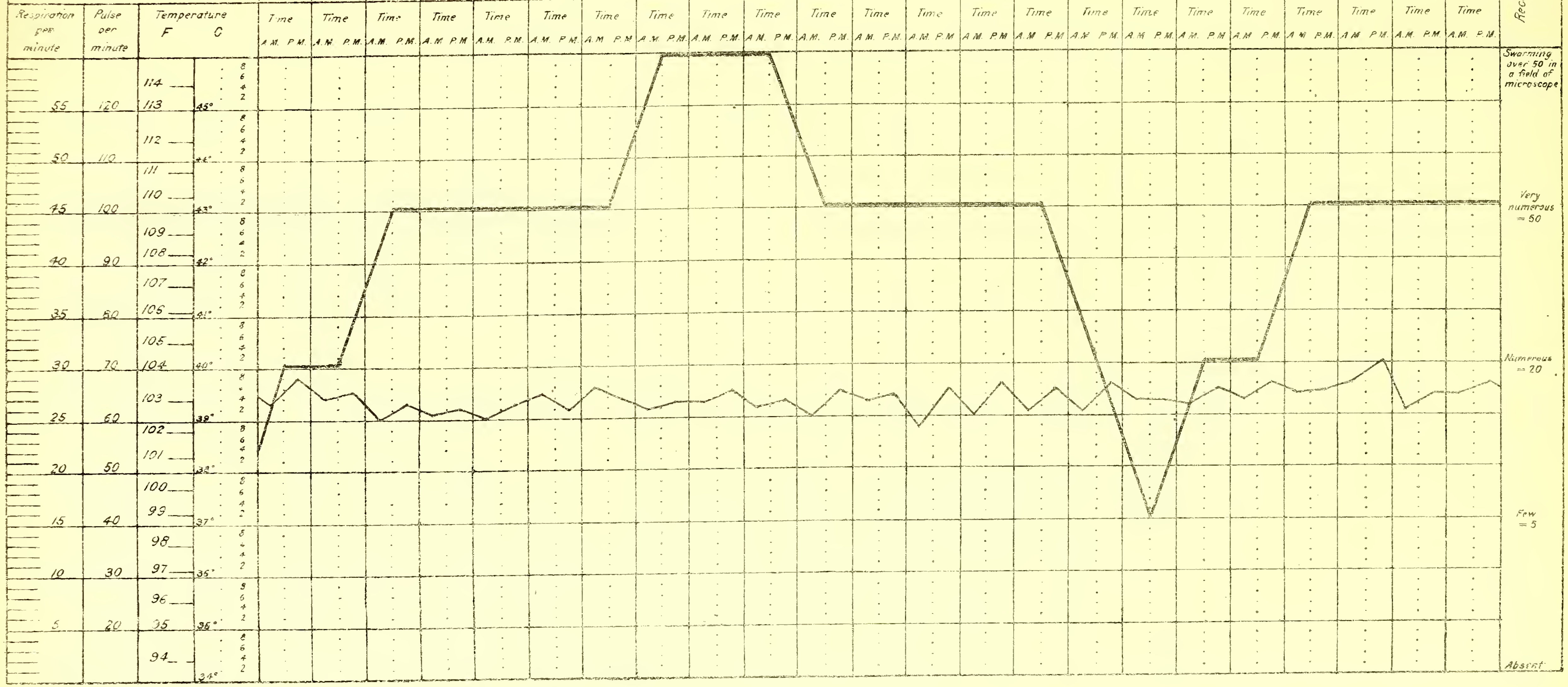
(S. 415)

Age ________ Sex ____________ Colour ____________

Age ______ Sex ______ Colour ______

Disease ______ Date of ______ Result ______ Date of Result ______ Register No. IV

Dates of Observation	Sept.r 26	27	28	29	30	Oct.r 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Days of Disease	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37
Organisms in Blood	N	N	VN	VN	VN	VN	VN	S	S	S	VN	VN	VN	VN	VN	N	F	N	N	VN	VN	VN	VN



G. 451

Hæmatozoon curve
Temperature

Drawn & Litho. Govt. Photozinco. Office Poona 1893.

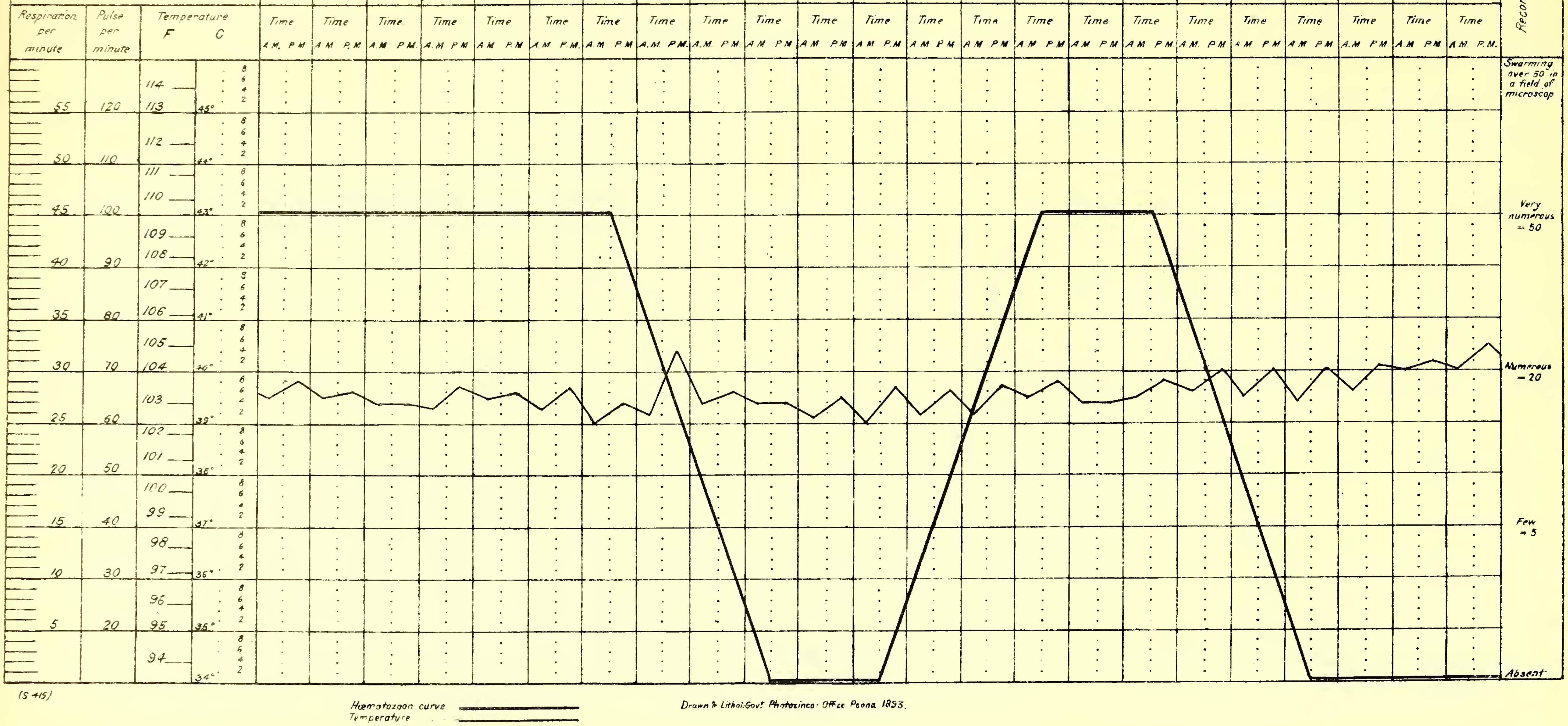
RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age ______ Sex ______ Colour ______

Disease ______ Date of ______ Result ______ Date of Result ______ Register No. IV ______

Dates of Observation	Oct.r 19	20	21	22	23	24	25	26	27	28	29	30	31	Nov.r 1	2	3	4	5	6	7	8	9	10
Days of Disease	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Organisms in Blood	VN	VN	VN	VN	VN.	VN	VN	N	F	—	—	—	F	N	VN	VN	VN	N	F	—	—	—	—



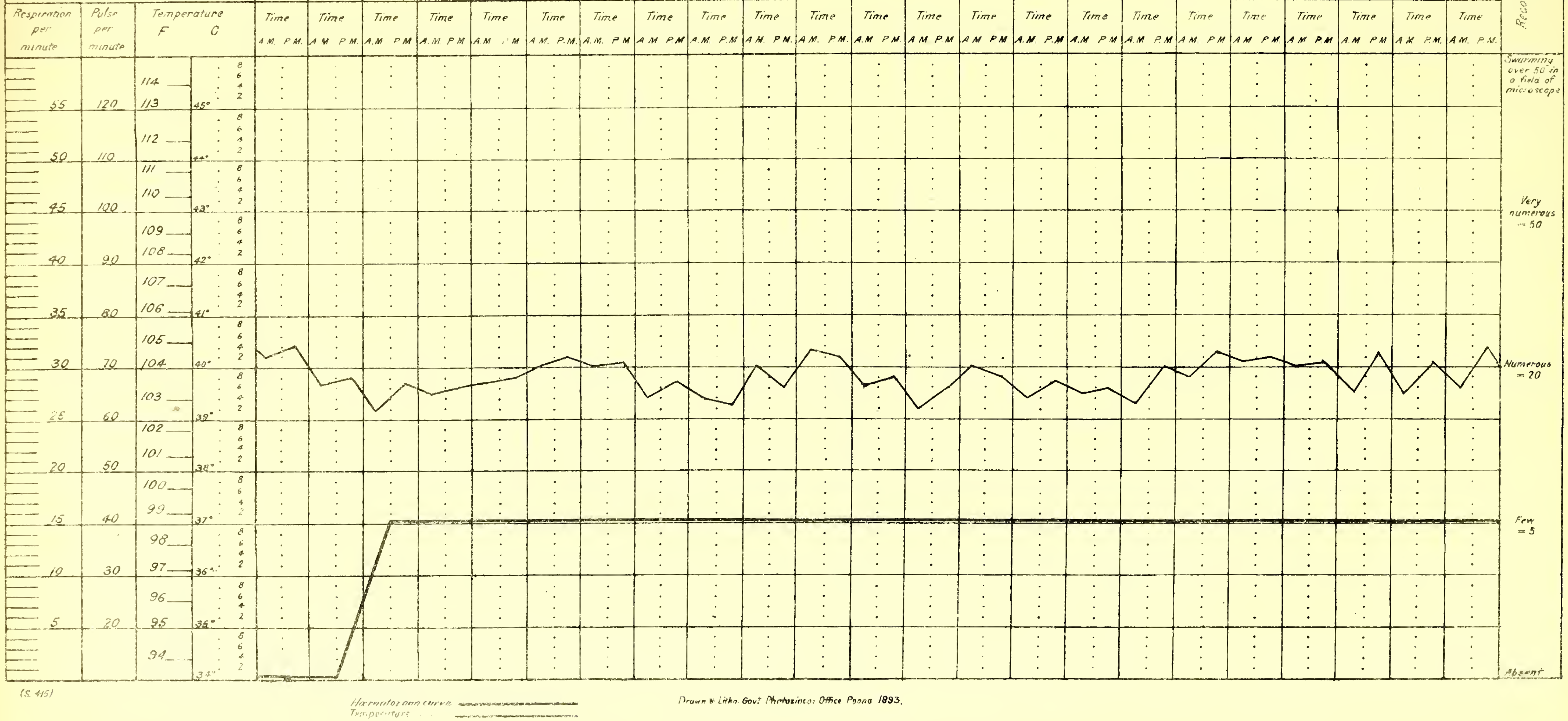
(S 415)

Drawn & Lithd. Govt. Photozinco. Office Poona 1893.

Age ______ Sex ______ Colour ______

Disease ______ Date of ______ Result ______ Date of Result ______ Register No. IV ______

Dates of Observation	Novr 11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Decr 1	2	3
Days of Disease	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83
Organisms in Blood	—	—	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F



(S. 415)

Drawn & Litho. Govt. Photozinco: Office Poona 1893.

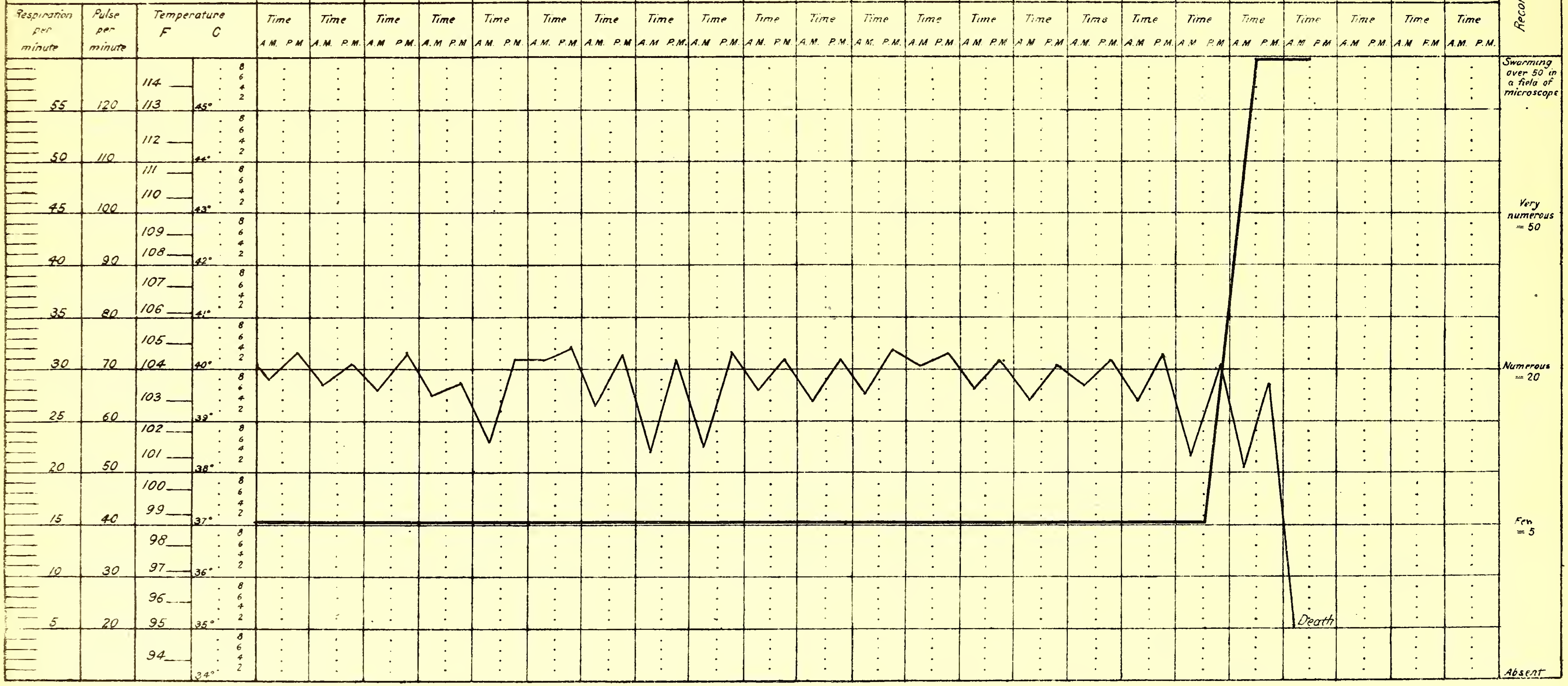
Age ______ Sex ______ Colour ______

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION

Age ______ Sex ______ Colour ______

Disease ______ Date of ______ Result ______ Date of Result ______ Register No. IV

Dates of Observation.	Dec.r 4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23			
Days of Disease	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103			
Organisms in Blood	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	S	S			



(S +15)

Hæmatozoon curve
Temperature ......

Drawn & Litho: Govt. Photozinco Office Poona 1893.

GUINEA-PIGS Nos. VII and VIII. *March 14th,* 1892.—These animals were inoculated subcutaneously with 0·2 c.c. of blood taken from the Bull.

No. VII. No. VIII.

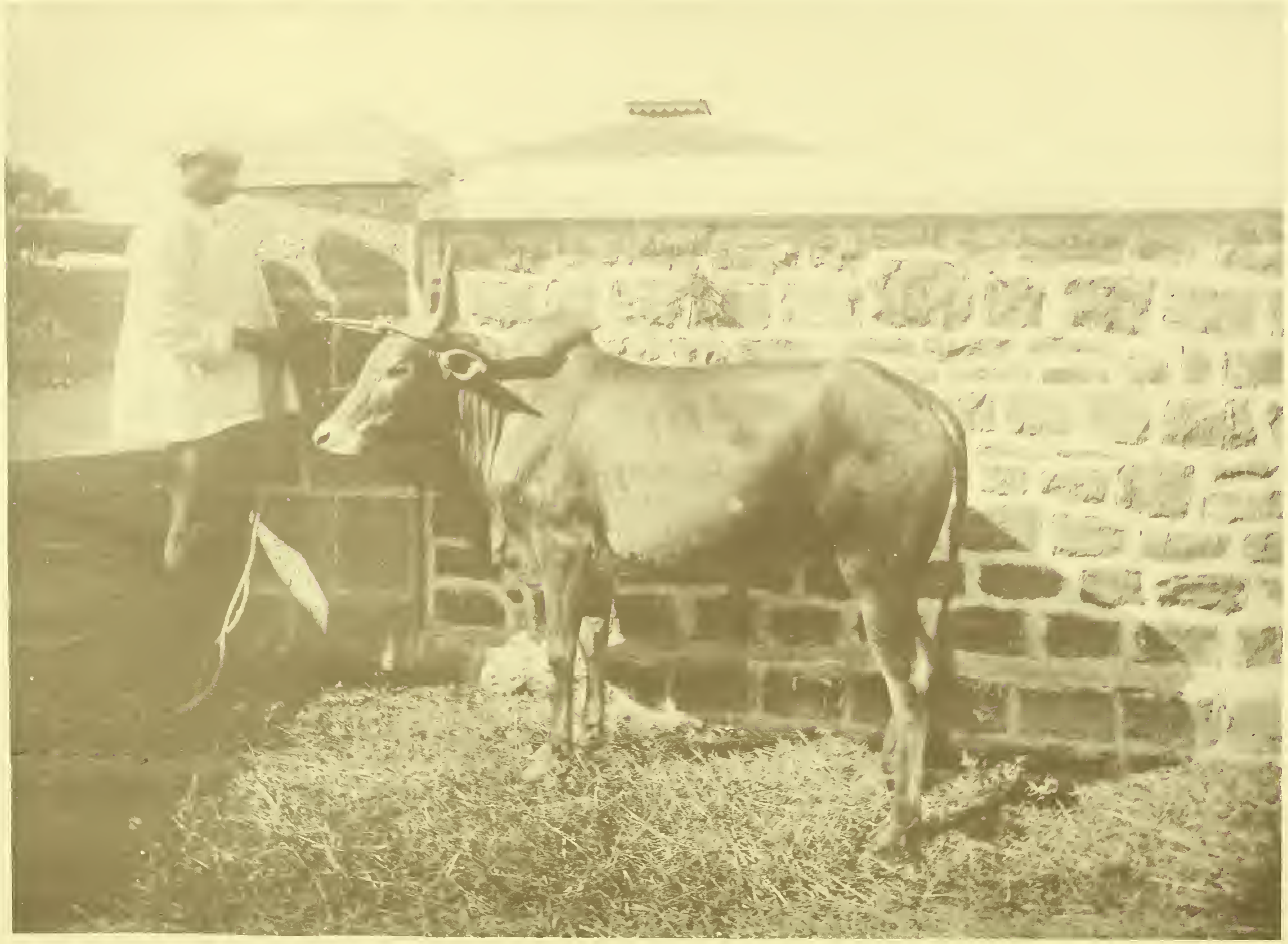
Month and Date.	Condition of blood.	Temperature.		Condition of blood.	Temperature.	
		A.M.	P.M.		A.M.	P.M.
1892.						
March						
14th...	No hæmatozoa in the blood ...	...	39·3°C	No hæmatozoa in the blood ...	...	39·5°C
15th...	" " ...	39·1°C	41°C	" " ...	39·3°C	40·4°C
16th...	" " ...	39·2°C	40·4°C	" " ...	39·3°C	40·1°C
17th...	" " ...	39°C	40·1°C	" " ...	39·3°C	40·3°C
18th...	" " ...	39·3°C	40·4°C	" " ...	39°C	40·3°C
19th...	" " ...	39·4°C	40·4°C	" " ...	38·7°C	39·8°C
20th...	" " ...	39°C	40°C	" " ...	39·1°C	40·2°C
21st...	" " ...	38·5°C	40°C	" " ...	38·2°C	40·3°C
22nd..	" " ...	39·4°C	40·2°C	" " ...	39·3°C	40·1°C
23rd...	" " ...	39·3°C	41°C	" " ...	39·4°C	40·5°C
24th...	" " ...	40·5°C	40·8°C	" " ...	39·6°C	40·4°C
25th...	" " ...	41·3°C	41°C	" " ...	39·5°C	41·1°C
26th...	" " ...	40·1°C	41·3°C	" " ...	39·3°C	41·5°C
27th...	" " ...	40·5°C	41·2°C	" " ...	39·5°C	40·8°C
28th...	" " ...	39·6°C	40·7°C	" " ...	39·3°C	40·5°C
29th...	" " ...	40·4°C	40·7°C	" " ...	39·5°C	40·2°C
30th...	" " ...	39·7°C	40·7°C	" " ...	39°C	40·4°C
31st...	" " ...	39·4°C	40·7°C	" " ...	39·8°C	40·5°C
April						
1st...	" " ...	39·2°C	40·3°C	" " ...	39·4°C	40·4°C
2nd..	" " ...	38·1°C	40·3°C	" " ...	39·4°C	40·6°C
3rd...	" " ...	38·7°C	40·5°C	" " ...	39·7°C	41°C
4th...	" " ...	38·7°C	41°C	" " ...	39·6°C	41·2°C
5th...	" " ...	38·8°C	41·2°C	" " ...	39·5°C	41·6°C
6th...	" " ...	39·3°C	41·5°C	" " ...	39·5°C	41·8°C
7th...	" " ...	39°C	41·1°C	" " ...	39·4°C	41·2°C
8th...	" " ...	39·1°C	40·6°C	" " ...	39·5°C	41·8°C
9th...	" " ...	38·1°C	41·2°C	" " ...	39·4°C	42°C
10th...	" " ...	39°C	40·8°C	" " ...	39·2°C	41·2°C
11th...	" " ...	39·5°C	41·1°C	" " ...	39·3°C	41°C
12th...	" " ...	39·6°C	40·8°C	" " ...	39·5°C	40·6°C
13th...	" " ...	39·8°C	41·1°C	" " ...	40°C	41·3°C
14th...	" " ...	39·5°C	41°C	" " ...	39·5°C	41·4°C
15th...	" " ...	39·2°C	40·6°C	" " ...	39·7°C	41·6°C
16th...	" " ...	38·5°C	39·3°C	" " ...	40°C	40·3°C
17th...	" " ...	39·4°C	40·8°C	" " ...	39·7°C	41°C
18th...	" " ...	39·4°C	40·6°C	" " ...	40°C	40·5°C
19th...	" " ...	39·5°C	40·6°C	" " ...	39·5°C	40·6°C
20th...	" " ...	39·4°C	41°C	" " ...	39·4°C	40·7°C
21st...	" " ...	39·4°C	40·8°C	" " ...	39·5°C	40·8°C
22nd..	" " ...	39·4°C	40·4°C	" " ...	39·5°C	40·6°C
23rd...	" " ...	39·3°C	40·6°C	" " ...	39·4°C	41·2°C
24th...	" " ...	39·4°C	41·3°C	" " ...	39·5°C	41·3°C
25th...	" " ...	39·4°C	41·3°C	" " ...	39·7°C	41·4°C
26th...	" " ...	40°C	41°C	" " ..	40·1°C	40·7°C
27th...	" " ...	39·4°C	40·6°C	" " ...	39·6°C	41°C
28th...	" " ...	39·3°C	40·5°C	" " ...	39·3°C	40·4°C
29th...	" " ...	39°C	40°C	" " ...	39·3°C	39·7°C
30th...	" " ...	39°C	40·4°C	" " ...	39·4°C	40°C
May						
1st...	" " ...	39·4°C	40°C	" " ...	39·5°C	39·7°C
2nd..	" " ...	39°C	40·1°C	" " ...	39·1°C	39·7°C
3rd..	" " ...	39·3°C	40°C	" " ...	39·3°C	40·4°C
4th...	" " ...	39·3°C	40·8°C	" " ...	39·5°C	40·5°C
5th..	" " ...	39·5°C	41·3°C	" " ...	39·7°C	41·4°C
6th...	" " ...	40°C	42·1°C	" " ...	39·4°C	40·6°C
7th...	" " ...	40°C	41·1°C	" " ...	40·1°C	41·1°C
8th...	" " ...	39°C	40°C	" " ...	39·4°C	41°C
9th...	" " ...	39·1°C	40·3°C	" " ...	39·7°C	41·1°C
10th...	" " ...	39·3°C	39·5°C	" " ...	39·4°C	40·1°C
11th...	" " ...	39°C	40·4°C	" " ...	39·7°C	40·2°C
12th...	" " ...	39·4°C	40·3°C	" " ...	39·5°C	40·4°C
13th...	" " ...	39·6°C	40°C	" " ...	40°C	40·2°C
14th...	" " ...	39·5°C	40·6°C	" " ...	40°C	40·4°C
15th...	" " ...	39°C	40·7°C	" " ...	39·8°C	40·6°C
16th ..	" " ...	39°C	40·1°C	" " ..	39·3°C	40·5°C
17th...	" " ...	39·1°C	40·6°C	" " ...	39·4°C	40·6°C
18th...	" " ...	38·4°C	40·3°C	" " ...	38·6°C	40·7°C
19th...	" " ..	39·3°C	40·3°C	" " ...	39·3°C	40·3°C
20th...	" " ...	38·6°C	40·6°C	" " ...	39·3°C	40·2°C
21st...	" " ...	39·6°C	39·4°C	" " ...	39·2°C	40·5°C
22nd ..	" " ...	39·4°C	39·8°C	" " ...	39·3°C	39·4°C
23rd...	" " ...	38·8°C	40°C	" " ...	39·3°C	39·4°C
24th...	" " ...	39·4°C	40°C	" " ...	39·4°C	39·6°C
25th...	" " ...	40·1°C	40·4°C	" " ..	89·3°C	40°0
26th...	" " ...	40°C	40·4°C	" " ...	39·5°C	40·2°C
27th...	" " ...	40·1°C	40·4°C	" " ...	40·1°C	40·1°C
28th..	" " ...	39·7°C	40·2°C	" " ...	39·8°C	40·3°C
29th...	" " ...	39·7°C	40·3°C	" " ...	40°C	40·5°C
30th...	" " ...	39·2°C	39·4°C	" " ...	39·4°C	39·4°C
31st...	" " ...	39·7°C	39·5°C	" " ...	39·4°C	39·6°C

No. VII.—*continued.* No. VIII.—*continued.*

Month and Date.	Condition of Blood.	Temperature.		Condition of Blood.	Temperature.	
		A.M.	P.M.		A.M.	P.M.
June						
1st...	No hæmatozoa in the blood ...	39·5°C	39·8°C	No hæmatozoa in the blood ...	39·8°C	40·3°C
2nd ..	,, ,, ...	39·2°C	49°C	,, ,, ...	39°C	40°C
3rd...	,, ,, ...	39·4°C	39·7°C	,, ,, ...	39·5°C	40·2°C
4th...	,, ,, ...	39·2°C	40·2°C	,, ,, ...	39·2°C	40°C
5th...	,, ,, ...	40°C	40·6°C	,, ,, ...	40°C	40·3°C
6th...	,, ,, ...	39·7°C	40·4°C	,, ,, ...	39·4°C	40·4°C
7th...	,, ,, ...	39·4°C	39·4°C	,, ,, ...	39·6°C	39·5°C
8th...	,, ,, ...	40°C	39·8°C	,, ,, ..	39·6°C	39·4°C
9th...	,, ,, ...	38·6°C	40·3°C	,, ,, ...	39·3°C	39·7°C
10th...	,, ,, ...	39·7°C	40·1°C	,, ,, ...	39·5°C	40·5°C
11th...	,, ,, ...	39·4°C	39·7°C	,, ,, ...	40°C	39·1°C
12th...	,, ,, ...	39·8°C	40·2°C	,, ,, ..	39·7°C	40·3°C
13th...	,, ,, ...	40·4°C	40·7°C	,, ,, ...	40·1°C	40·5°C
14th...	,, ,, ...	40·1°C	40·2°C	,, ,, ...	40·3°C	39·6°C
15th...	,, ,, ...	40°C	40·4°C	,, ,, ..	40°C	40·2°C
16th...	,, ,, ...	39·5°C	39·1°C	,, ,, ...	39·4°C	40°C
17th...	,, ,, ...	39·3°C	39·3°C	,, ,, ...	39·4°C	39·4°C
18th...	,, ,, ..	39·8°C	40·2°C	,, ,, ...	40°C	40·5°C
19th...	,, ,, ...	39·6°C	40·3°C	,, ,, ...	39·4°C	40·1°C
20th...	,, ,, ...	39·4°C	39·7°C	,, ,, ...	39·3°C	39·8°C
21st...	,, ,, ...	39·3°C	39·7°C	,, ,, ...	39·6°C	40·1°C
22nd ..	,, ,, ...	39·7°C	39·5°C	,, ,, ...	40°C	39·6°C
23rd...	,, ,, ...	39·4°C	39°C	,, ,, ...	40°C	39·3°C
24th...	,, ,, ...	39·3°C	39·3°C	,, ,, ...	39·4°C	39·5°C
25th...	,, ,, ..	39·6°C	40°C	,, ,, ...	39·8°C	39·7°C
26th...	,, ,, ...	39°C	40°C	,, ,, ...	39·3°C	40·2°C
27th...	,, ,, ...	39·3°C	40°C	,, ,, ...	39·7°C	40·3°C
28th..	,, ,, ...	40·1°C	40·4°C	,, ,, ...	40·1°C	40·5°C
29th...	,, ,, ...	39·7°C	40·1°C	,, ,, ...	40°C	39·7°C
30th...	,, ,, ...	39·3°C	40·1°C	,, ,, ...	39·6°C	40·1°C
July						
1st...	,, ,, ...	39·4°C	39·6°C	,, ,, ...	39·6°C	40°C.
2nd ..	,, ,, ...	39·5°C	40°C	,, ,, ...	39·6°C	40·2°C
3rd...	,, ,, ...	39·4°C	40·3°C	,, ,, ...	39·5°C	40°C
4th...	,, ,, ...	39·4°C	40·2°C	,, ,, ...	39·4°C	40·5°C
5th...	,, ,, ...	39·2°C	40°C	,, ,, ...	39·7°C	40·2°C
6th...	,, ,, ...	39·3°C	40·2°C	,, ,, ...	39·4°C	40·4°C
7th...	,, ,, ...	39·7°C	39·3°C	,, ,, ...	39·8°C	39·5°C
8th...	,, ,, ...	39·2°C	39·3°C	,, ,, ...	39·4°C	40°C
9th...	,, ,, ...	39·3°C	39·4°C	,, ,, ...	39·3°C	39·3°C
10th...	,, ,, ...	39·5°C	39·3°C	,, ,, ...	39·3°C	39·5°C
11th...	,, ,, ...	38°C	39°C	,, ,, ...	38°C	39·4°C
12th...	,, ,, ...	39·3°C	39·6°C	,, ,, ...	39·6°C	39·5°C
13th ..	,, ,, ...	38·3°C	39·4°C	,, ,, ...	39°C	39·6°C
14th...	,, ,, ...	38·3°C	38·8°C	,, ,, ...	38°C	38·6°C
15th...	,, ,, ...	39·5°C	39·8°C	,, ,, ...	39·1°C	39·6°C
16th..	,, ,, ...	38·3°C	39°C	,, ,, ...	39·1°C	39·4°C
17th...	,, ,, ...	38°C	39·2°C	,, ,, ...	39·2°C	39·4°C
18th ..	,, ,, ...	38·6°C	40·3°C	,, ,, ...	38·5°C	40°C
19th...	,, ,, ...	39·3°C	40°C	,, ,, ...	38·7°C	39·8°C
20th ..	,, ,, ...	39·8°C	39·3°C	,, ,, ...	39·4°C	39·4°C
21st ...	,, ,, ...	39°C	39·6°C	,, ,, ..	39°C	39·5°C
22nd ..	,, ,, ...	38·6°C	39·7°C	,, ,, ...	38·5°C	39·6°C
23rd...	,, ,, ...	39·7°C	39·7°C	,, ,, ...	39·4°C	39·7°C
24th...	,, ,, ...	39·3°C	39·5°C	,, ,, ...	39·4°C	39·5°C
25th...	,, ,, ...	39·1°C	...	,, ,, ...	39·3°C	...
	Results negative.			*Results negative.*		

Remarks.—This animal (Bull) was brought to the Laboratory on the 5th March 1891 and was kept under observation until the 24th of the same month, during which time it appeared quite healthy and normal in every respect. On the latter date, it was inoculated subcutaneously in the right thigh with 1·75c.c. of blood (containing numerous Surra hæmatozoa) drawn from the Left Jugular Vein of Horse No. XIX, previously inoculated with the same disease. On the evening of the 28th March, the temperature rose to 39·7°C. and on the following morning, one hæmatozoon was discovered on microscopical examination, after searching through several specimens of blood. On the 30th, no hæmatozoa were found in the blood, but on the 31st March and April 1st, a few were recognized; from this date until the 17th June, no more hæmatozoa or their immature forms were found, although carefully searched for. On June 17th, 1891, eighty-five days after the inoculation of the Bull, two Guinea-pigs were inoculated subcutaneously in the right inguinal region with 0·2c.c. of blood taken from the ear of the animal after carefully washing the part with soap and water and then with Mercuric Perchloride solution 5 per cent. No. I Guinea-pig developed hæmatozoa in the blood on the 27th, ten days after inoculation, whilst No. II Guinea-pig did not develop any until the 5th July, or 18 days after inoculation. The hæmatozoa were present off and on in the blood of these Guinea-pigs for a considerable period. No. I Guinea-pig finally succumbed to the disease on the 8th November 1891, or 144 days after the inoculation: whilst No. II died on the 12th October 1891, or 117 days after inoculation.

During the interval which elapsed between the 17th June and 3rd September 1891, no hæmatozoa were discovered in the blood of the Bull, although several coverglass-speci-



BULL NO. 1.

INOCULATED WITH HORSE SURRA, 24 MARCH 1891. RE-INOCULATED, 22 AUGT. 1892. PHOTOGRAPHED, 23 NOV. 1892.

CALCUTTA PHOTOTYPE COMPANY

mens were examined every day. Consequently two more Guinea-pigs were inoculated. These were distinguished as Nos. III and IV and each received 0·2c.c. of blood drawn from the ear of the Bull, with antiseptic precautions, on the 163rd day after the inoculation of the animal with Surra. No. III developed Surra hæmatozoa in its blood on the tenth day following inoculation, and these were present with few exceptions until the day of its death, October 24th, 1891, fifty-one days after inoculation. No. IV developed Surra hæmatozoa also on the tenth day after inoculation, and they remained almost constantly present in the blood until the day of death on the 14th December 1891, one hundred and two days after inoculation.

During the period which elapsed between September 3rd, on which Guinea-pigs III and IV were inoculated, and November 13th, 1891, the morning and evening temperatures of the Bull oscillated as much as two or more degrees; no hæmatozoa were discovered, although, as before stated, great care was bestowed upon the examination of the blood each day.

On November 13th, 1891, that is, 234 days after the inoculation of the Bull, two Guinea-pigs V and VI were inoculated with 0·2c.c. of blood from the Bulls' ear, but as no hæmatoza were found during the next 32 days, they were re-inoculated on the 16th December 1891, 267 days after the inoculation of the Bull, but with *negative* results a second time.

Between the latter date, December 16th, 1891, and March 14th, 1892, the Bull appeared to be enjoying good health and putting on flesh. On this date March 14th, 1892, that is, 356 days from the time of inoculation, two new Guinea-pigs VII and VIII were inoculated as previously described with 0·2c.c. of blood from the ear of the Bull, but these experiments were followed by *negative* results. Since March 14th, the Bull has been in very fine condition, and as it is desirable to ascertain whether animals of the bovine species are liable to a second attack of *Surra,* it was resolved to re-inoculate this animal with a more virulent type of Surra obtained by passing the hæmatozoon of the rat (Mus decumanus) through the horse and donkey. This second inoculation was performed on August 22nd, 1892, at 11 A.M., 1 c.c. of blood drawn from the Jugular Vein of the donkey being injected subcutaneously over the left shoulder, the blood at the time containing very numerous and active hæmatozoa.

TABLE.

Showing the dates of inoculation and re-inoculation of the Bull, and also those of the Guinea-Pigs inoculated with the blood of the former, as well as the result in each case.

Animal.	Inoculated from horse No. XIX.	Date of inoculation of Guinea-Pigs with Bull's blood.	Guinea-Pigs inoculated No. of days after Bull's inoculation.	Date of Hæmatozoa 1st appearance in the blood.	Guinea-Pigs died.	No. of days Guinea-Pigs lived.	Date of re-inoculation with blood of Donkey.	Date of re-inoculation of Guinea-Pigs after inoculation of Bull.	No. of days Guinea-Pigs inoculated after 1st inoculation of Bull.	Date of inoculation of Guinea-Pigs after Bull's re-inoculation.	No. of days Guinea-Pig inoculated after re-inoculation of Bull.	Remarks.
	D. m. y.	D. m. y.	Days.	D. m. y.	D. m. y.	Days.	D. m. y.	D. m. y.	Days.	D. m. y.	Days.	
Bull	24 3 91	..	..	29 3 91	..	..	22 8 92	..	..	..	..	1st Positive. 2nd Negative.
Guinea-Pig No. I ..	..	17 6 91	85	27 6 91	8 11 91	144	..	..	..	..	..	
,, II ..	..	17 6 91	85	5 7 91	12 10 91	117	..	..	..	..	..	
,, III ..	..	3 9 91	163	12 9 91	24 10 91	51	..	..	..	..	..	
,, IV ..	..	3 9 91	163	12 9 91	14 12 91	102	..	..	..	..	..	
,, V ..	..	13 11 91	234	..	..	..	..	16 12 91	267	..	..	Results negative.
,, VI ..	..	13 11 91	234	..	..	..	..	16 12 91	267	..	..	,, ,,
,, VII	..	14 3 92	356	..	..	..	..	..	..	..	..	,, ,,
,, VIII ..	..	14 3 92	356	..	..	..	..	..	..	..	..	,, ,,
,, IX ..	..	..	..	..	..	..	..	..	..	21 9 92	30	,, ,,
,, X ..	..	..	..	..	..	..	..	..	..	21 9 92	30	,, ,,

The chief points to draw attention to in this case are :—

This is the first case recorded of any animal of the bovine species having been successfully inoculated with the hæmatozoon of *Surra.*

The short period during which the hæmatozoa were observed in the blood of the animal, and the small numbers of them present at any time during that period.

That although no hæmatozoa or their immature forms were recognizable in the blood after very numerous and careful observations, nevertheless Guinea-pigs inoculated with relatively small quantities of it, on the 85th day after the inoculation of the Bull, developed hæmatozoa exactly resembling the organisms observed in the blood of the animal from which it was primarily taken, and died from the effects of Surra after a period of 117 and 144 days respectively.

That Guinea-pigs subcutaneously injected with a small quantity of this Bull's blood on the 163rd day after its inoculation, under exactly the same conditions as those before described, developed hæmatozoa in their blood after a period of several days and finally succumbed to the disease on the 51st and 102nd day after inoculation.

That Guinea-pigs inoculated with the same Bull's blood on the 234th, 267th and 356th day respectively after the inoculation of the animal, should remain healthy and at no time develop hæmatozoa in their blood. That the blood withdrawn from the Bull on the 163rd day after inoculation should prove to be more virulent than that taken on the 85th day, as demonstrated by the second pair of Guinea-pigs dying on the 51st and 102nd day respectively, although the first animals did not succumb until the 117th and 144th day.

That the Bull should be able to throw off the disease (Surra) entirely and become strong and fat, is worthy of notice and may prove important in the future treatment of the disease, especially when we recall the absolute fatality observed amongst horses afflicted with this disease.

On the 512th day after the appearance of the hæmatozoon in the blood of the animal it was subjected to re-inoculation, this time with blood containing the hæmatozoon of a more virulent type.

The fact that the blood of the Bull should, by inoculation, be capable of reproducing the disease 155 days after the last appearance of the hæmatozoon in it, is a very important one from a clinical point of view, showing the length of time during which an animal must be kept under observation, before being pronounced safe.

Although the hæmatozoon is capable of growth in the blood of cattle, it nevertheless does not appear to be a very suitable medium for its development, as it apparently loses much of its virulence, producing only a mild form of the disease.

This loss of virulence on introduction of the hæmatozoon into the bovine species, rather points to the fact that there may be a possibility of producing some form of immunity in other species of animals, by the introduction, subcutaneously or by intravenous injection, either of the blood itself or of the proteid material obtained from the blood of bovines, some time after their inoculation with Surra.

It appears possible that cattle may contract the disease if submitted to the same condition as horses, which are supposed to contract Surra by drinking water or grazing on low lands, which have been previously flooded and where the contagium is present. And although suffering from a mild form, may be the means of distributing the virus over a considerable area. This may account for some of the numerous cases of fever in cattle, the nature and causes of which, up to the present, have not been made out.

SHEEP No. 1.

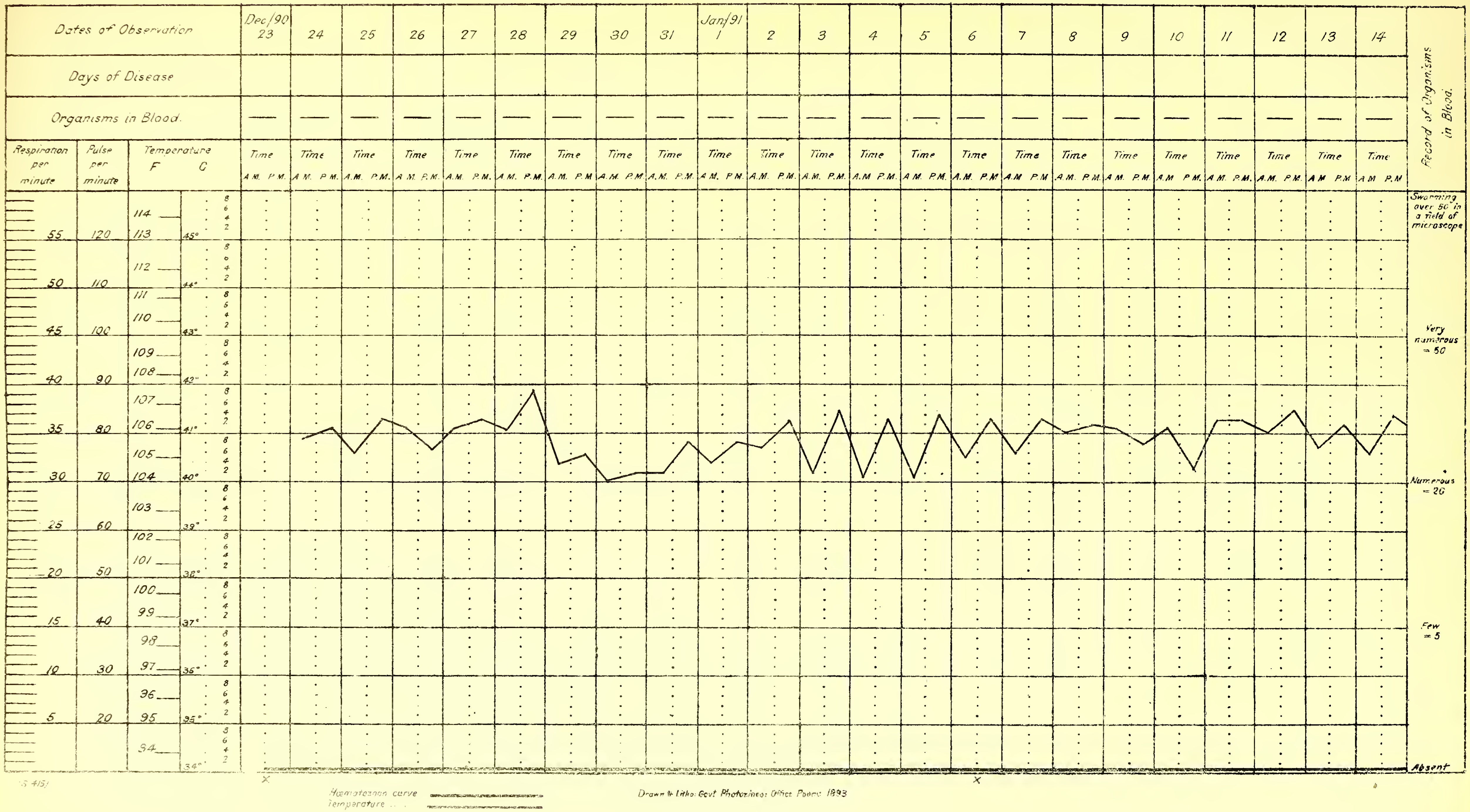
A young country-bred Ram inoculated on December 23rd, 1890, subcutaneously with ·8 c.c. of blood taken from the Jugular Vein of Horse No. VII.

24th Dec. 1890—		Temp. A.M. 40·9°C.	P.M. 41·1°C.	No hæmatozoa observed in the blood.
25th	„	Temp. A.M. 40·6°C.	P.M. 41·3°C.	No hæmatozoa observed in the blood.
26th	„	Temp. A.M. 41·1°C.	P.M. 40·7°C.	No hæmatozoa observed in the blood.
27th	„	Temp. A.M. 41·1°C.	P.M. 41·3°C.	No hæmatozoa observed in the blood.
28th	„	Temp. A.M. 41·1°C.	P.M. 41·9°C.	No hæmatozoa observed in the blood.
29th	„	Temp. A.M. 40·4°C.	P.M. 40·6°C.	No hæmatozoa observed in the blood.
30th	„	Temp. A.M. 40°C.	P.M. 40·2°C.	No hæmatozoa observed in the blood.
31st	„	Temp. A.M. 40·2°C.	P.M. 40·8°C.	No hæmatozoa observed in the blood.
1st Jan. 1891—		Temp. A.M. 40·4°C.	P.M. 40·8°C.	No hæmatozoa observed in the blood.
2nd	„	Temp. A.M. 40·7°C.	P.M. 41·3°C.	No hæmatozoa observed in the blood.
3rd	„	Temp. A.M. 40·2°C.	P.M. 41·5°C.	No hæmatozoa observed in the blood.
4th	„	Temp. A.M. 40·1°C.	P.M. 41·3°C.	No hæmatozoa in the blood.
5th	„	Temp. A.M. 40·1°C.	P.M. 41·4°C.	No hæmatozoa observed in the blood.
6th	„	Temp. A.M. 40·5°C.	P.M. 41·3°C.	Injected subcutaneously into the Right Inguinal Region 1·0c.c. of blood taken from the Left Jugular Vein of Horse No. IV.
7th	„	Temp. A.M. 40·6°C.	P.M. 41·3°C.	No hæmatozoa observed in the blood.
8th	„	Temp. A.M. 41°C.	P.M. 41·2°C.	No hæmatozoa observed in the blood.
9th	„	Temp. A.M. 41·1°C.	P.M. 40·8°C.	No hæmatozoa observed in the blood.
10th	„	Temp. A.M. 41·1°C.	P.M. 40·3°C.	No hæmatozoa observed in the blood.
11th	„	Temp. A.M. 41·3°C.	P.M. 41·3°C.	No hæmatozoa observed in the blood.
12th	„	Temp. A.M. 41°C.	P.M. 41·5.°C.	No hæmatozoa observed in the blood.
13th	„	Temp. A.M. 40·7°C.	P.M. 41·2°C.	No hæmatozoa observed in the blood.
14th	„	Temp. A.M. 40·6°C.	P.M. 41·4°C.	No hæmatozoa observed in the blood.
15th	„	Temp. A.M. 41·1°C.	P.M. 41·5°C.	No hæmatozoa observed in the blood.
16th	„	Temp. A.M. 40·7°C.	P.M. 41·8°C.	No hæmatozoa observed in the blood.
17th	„	Temp. A.M. 40·5°C.	P.M. 41·2°C.	No hæmatozoa observed in the blood.
18th	„	Temp. A.M. 40·6°C.	P.M. 41·1°C.	No hæmatozoa observed in the blood.
19th	„	Temp. A.M. 40·7°C.	P.M. 41·5°C.	No hæmatozoa observed in the blood.
20th	„	Temp. A.M. 41·2°C.	P.M. 41·6°C.	No hæmatozoa observed in the blood.
21st	„	Temp. A.M. 41·3°C.	P.M. 41·8°C.	No hæmatozoa observed in the blood.
22nd	„	Temp. A.M. 41·3°C.	P.M. 41·3°C.	No hæmatozoa observed in the blood.
23rd	„	Temp. A.M. 40·9°C.	P.M. 41·6°C.	No hæmatozoa observed in the blood.
24th	„	Temp. A.M. 40·2°C.	P.M. 41·7°C.	Inoculated two Guinea-pigs in the Right Inguinal Region with ·7c.c. of blood removed from the inner surface of the Ram's ear. No hæmatozoa observed in the blood.
25th	„	Temp. A.M. 41·5°C.	P.M. 41·6°C.	No hæmatozoa observed in the blood.
26th	„	Temp. A.M. 41·4°C.	P.M. 41·7°C.	No hæmatozoa observed in the blood.
27th	„	Temp. A.M. 41·1°C.	P.M. 41·8°C.	No hæmatozoa observed in the blood.
28th	„	Temp. A.M. 41·2°C.	P.M. 40·1°C.	No hæmatozoa observed in the blood.
29th	„	Temp. A.M. 41·3°C.	P.M. 41·2°C.	No hæmatozoa observed in the blood.
30th	„	Temp. A.M. 40·8°C.	P.M. 41·4°C.	No hæmatozoa observed in the blood.
31st	„	Temp. A.M. 40·7°C.	P.M. 40·8°C.	No hæmatozoa observed in the blood.
1st Feb.	„	Temp. A.M. 41·6°C.	P.M. 41·6°C.	No hæmatozoa in the blood.
2nd	„	Temp. A.M. 41·4°C.	P.M. 41·3°C.	No hæmatozoa observed in the blood.
3rd	„	Temp. A.M. 41·1°C.	P.M. 40·5°C.	There is some fluid in the right tunica vaginalis and slight orchitis. No hæmatozoa observed in the blood.
4th	„	Temp. A.M. 40·3°C.	P.M. 41·3°C.	No hæmatozoa observed in the blood.
5th	„	Temp. A.M. 40·8°C.	P.M. 41·5°C.	No hæmatozoa observed in the blood.
6th	„	Temp. A.M. 41·3°C.	P.M. 41·6°C.	No hæmatozoa observed in the blood.
7th	„	Temp. A.M. 40·7°C.	P.M. 41·2°C.	No hæmatozoa observed in the blood.
8th	„	Temp. A.M. 41·2°C.	P.M. 41·3°C.	No hæmatozoa observed in the blood.
9th	„	Temp. A.M. 41°C.	P.M. 41·6°C.	No hæmatozoa observed in the blood.

10th Feb.	1891—	Temp. A.M. 41°C.	P.M. 41·7°C.	No hæmatozoa observed in the blood.
11th	„	Temp. A.M. 40·4°C.	P.M. 41·6°C.	No hæmatozoa observed in the blood.
12th	„	Temp. A.M. 40·6°C.	P.M. 41·8°C.	No hæmatozoa observed in the blood.
13th	„	Temp. A.M. 40·6°C.	P.M. 41·5°C.	No hæmatozoa observed in the blood.
14th	„	Temp. A.M. 41·4°C.	P.M. 41·5°C.	No hæmatozoa observed in the blood.
15th	„	Temp. A.M. 41·6°C.	P.M. 41·8°C.	No hæmatozoa observed in the blood.
16th	„	Temp. A.M. 41·4°C.	P.M. 41·6°C.	No hæmatozoa observed in the blood.
17th	„	Temp. A.M. 41·1°C.	P.M. 41·4°C.	No hæmatozoa observed in the blood.
18th	„	Temp. A.M. 41·2°C.	P.M. 41·6°C.	No hæmatozoa observed in the blood.
19th	„	Temp. A.M. 41·4°C.	P.M. 41·5°C.	No hæmatozoa observed in the blood.
20th	„	Temp. A.M. 41·3°C.	P.M. 41·6°C.	There is a discharge of muco-purulent material from the right nostril, but no hæmatozoa can be discovered in it. Orchitis still continues. The fluid in the tunica vaginalis contains a few hæmatozoa.
21st	„	Temp. A.M. 41·3°C.	P.M. 41·5°C.	No hæmatozoa observed in the blood.
22nd	„	Temp. A.M. 41·3°C.	P.M. 41·5°C.	No hæmatozoa observed in the blood.
23rd	„	Temp. A.M. 41·3°C.	P.M. 41·3°C.	No hæmatozoa observed in the blood. The right testicle is smaller but is still tender on pressure.
24th	„	Temp. A.M. 41·2°C.	P.M. 41·6°C.	No hæmatozoa observed in the blood.
25th	„	Temp. A.M. 41·4°C.	P.M. 41·6°C.	The fluid in the right tunica vaginalis has been absorbed but the testicle is larger.
26th	„	Temp. A.M. 41·1°C.	P.M. 41·3°C.	No hæmatozoa observed in the blood.
27th	„	Temp. A.M. 41·4°C.	P.M. 41·6°C.	No hæmatozoa observed in the blood.
28th	„	Temp. A.M. 41·4°C.	P.M. 41·6°C.	No hæmatozoa in the blood.
1st Mar.	„	Temp. A.M. 41·3°C.	P.M. 41·7°C.	No hæmatozoa observed in the blood.
2nd	„	Temp. A.M. 41·5°C.	P.M. 41·7°C.	No hæmatozoa observed in the blood.
3rd	„	Temp. A.M. 41·4°C.	P.M. 41·5°C.	No hæmatozoa observed in the blood.
4th	„	Temp. A.M. 41·2°C.	P.M. 41·5°C.	No hæmatozoa observed in the blood.
5th	„	Temp. A.M. 41·3°C.	P.M. 41·5°C.	No hæmatozoa observed in the blood.
6th	„	Temp. A.M. 41·3°C.	P.M. 41·5°C.	No hæmatozoa observed in the blood.
7th	„	Temp. A.M. 41·7°C.	P.M. 40·8°C.	No hæmatozoa observed in the blood.
8th	„	Temp. A.M. 40·8°C.	P.M. 41·3°C.	No hæmatozoa observed in the blood.
9th	„	Temp. A.M. 40·1°C.	P.M. 41·8°C.	No hæmatozoa observed in the blood.
10th	„	Temp. A.M. 40·8°C.	P.M. 40·9°C.	No hæmatozoa observed in the blood.
11th	„	Temp. A.M. 41°C.	P.M. 41·5°C.	No hæmatozoa observed in the blood.
12th	„	Temp. A.M. 40·4°C.	P.M. 41·5°C.	No hæmatozoa observed in the blood.
13th	„	Temp. A.M. 40·6°C.	P.M. 40·8°C.	No hæmatozoa observed in the blood.
14th	„	Temp. A.M. 40·5°C.	P.M. 40·7°C.	No hæmatozoa observed in the blood.
15th	„	Temp. A.M. 40·5°C.	P.M. 40·6°C.	No hæmatozoa observed in the blood.
16th	„	Temp. A.M. 40·3°C.	P.M. 40·6°C.	No hæmatozoa observed in the blood.
17th	„	Temp. A.M. 40·6°C.	P.M. 40·5°C.	No hæmatozoa observed in the blood.
18th	„	Temp. A.M. 40·5°C.	P.M. 40·6°C.	No hæmatozoa observed in the blood.
19th	„	Temp. A.M. 41·1°C.	P.M. 41·3°C.	No hæmatozoa observed in the blood.
20th	„	Temp. A.M. 40·4°C.	P.M. 41·2°C.	No hæmatozoa observed in the blood.
21st	„	Temp. A.M. 40·2°C.	P.M. 40·8°C.	No hæmatozoa observed in the blood.
22nd	„	Temp. A.M. 40·5°C.	P.M. 40·6°C.	No hæmatozoa observed in the blood.
23rd	„	Temp. A.M. 40·7°C.	P.M. 40·8°C.	No hæmatozoa observed in the blood.
24th	„	Temp. A.M. 40·5°C.	P.M. 40·6°C.	No hæmatozoa observed in the blood.
25th	„	Temp. A.M. 40·4°C.	P.M. 40·8°C.	No hæmatozoa observed in the blood.
26th	„	Temp. A.M. 40·5°C.	P.M. 40·6°C.	No hæmatozoa observed in the blood.
27th	„	Temp. A.M. 41·2°C.	P.M. 41·4°C.	No hæmatozoa observed in the blood.
28th	„	Temp. A.M. 40·6°C.	P.M. 41·5°C.	No hæmatozoa observed in the blood.
29th	„	Temp. A.M. 40·8°C.	P.M. 40·5°C.	No hæmatozoa observed in the blood.
30th	„	Temp. A.M. 40·6°C.	P.M. 41·3°C.	No hæmatozoa observed in the blood. Patient is unable to rise from the recumbent position.
31st	„	Temp. A.M. 40·6°C.	P.M. 40·8°C.	No hæmatozoa observed in the blood.

Sheep. Inoculated Subcutaneously with blood taken from ______ the jugular vein of Horse N. ______ Age 1 year Sex M Colour ______

Disease ______ Surra ______ Date of Inoculation 23 · 12 · 1890 ______ Result Death Date of Result 29 · 4 · 91. Register No. I ______



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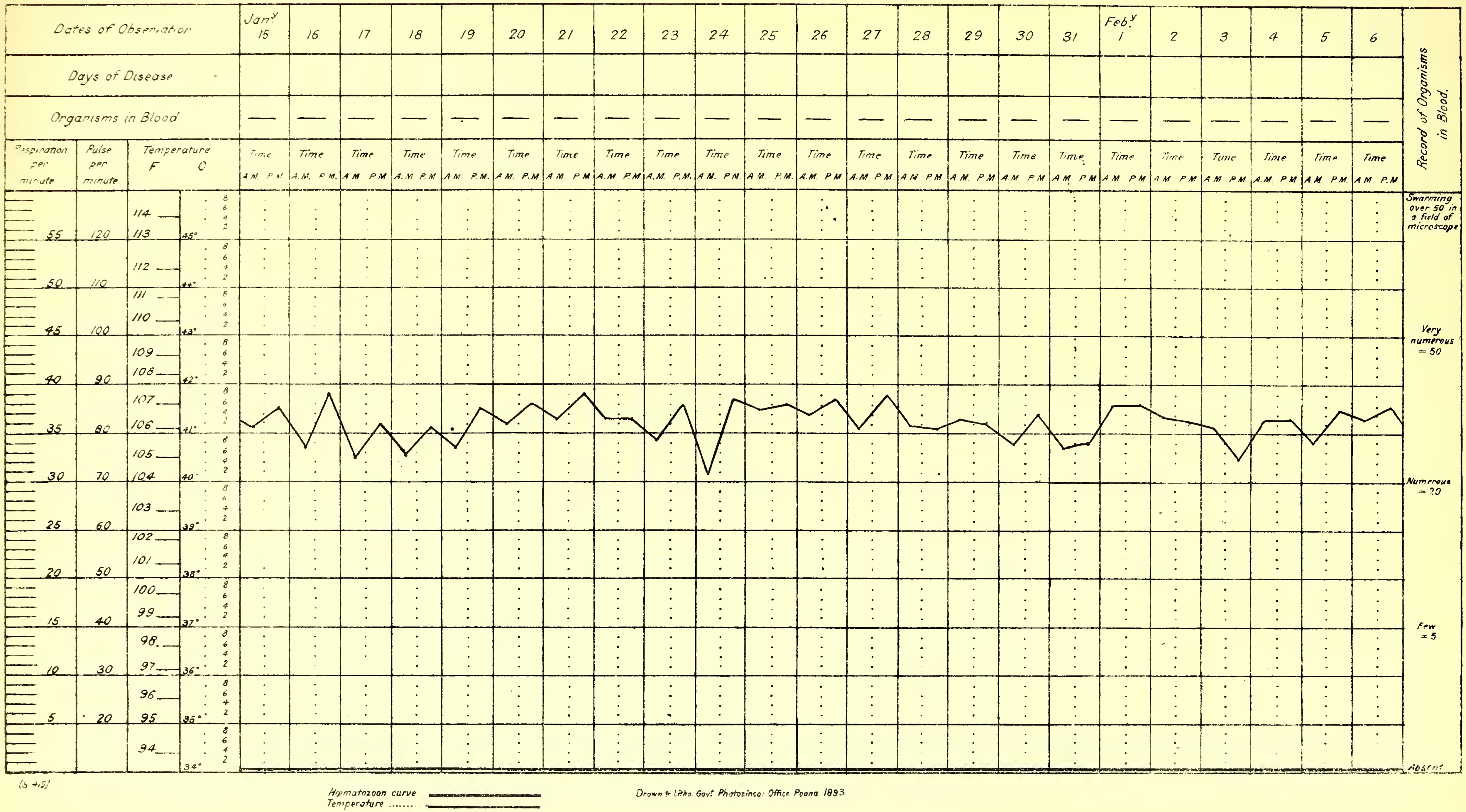
RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Sheep ______ Age ______ Sex, Male. ______ Colour ______

Disease ______ Date of ______ Result ______ Date of Result ______ Register No. ______

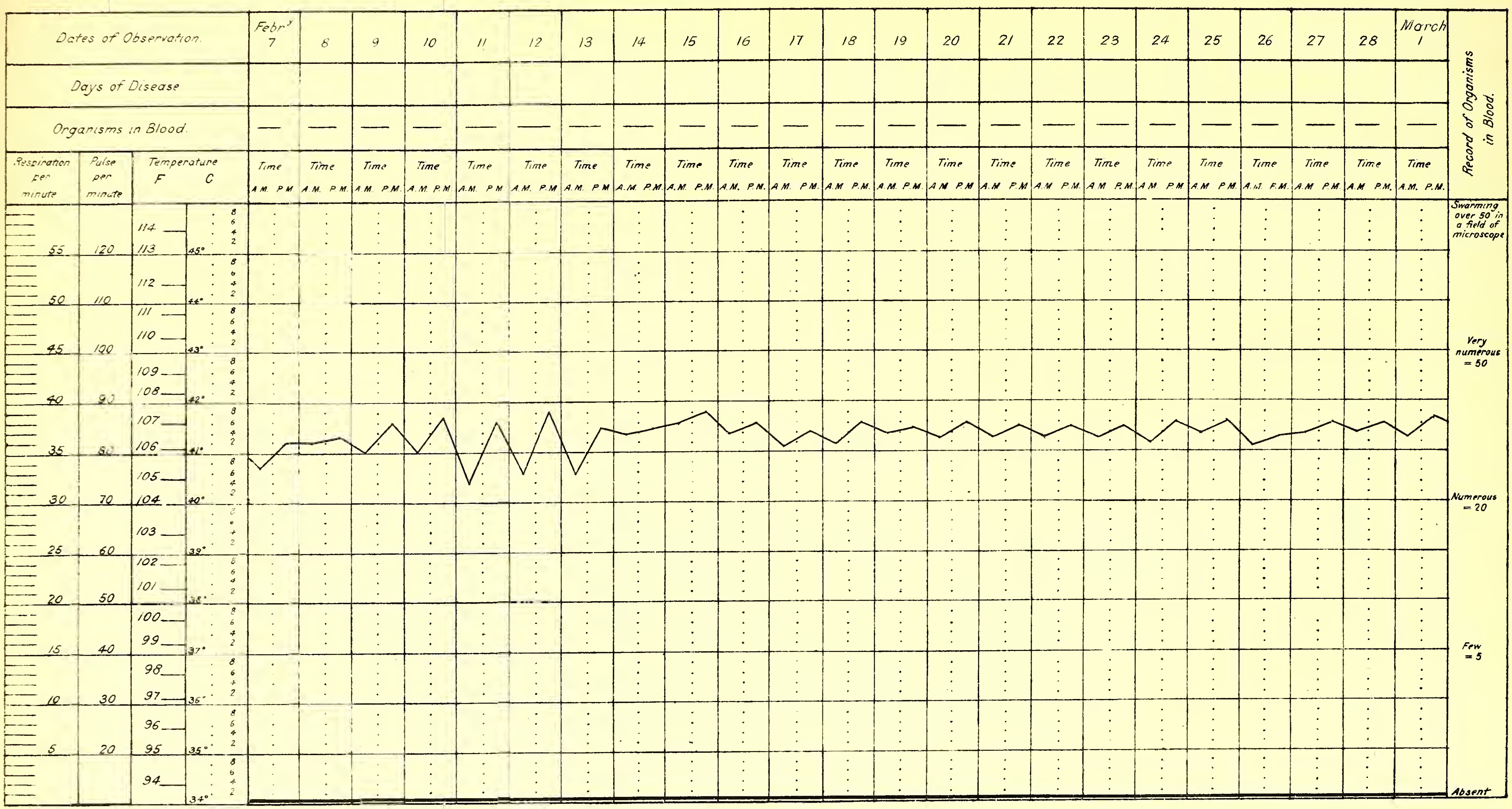


(S 415)

Drawn & Litho. Govt. Photozinco: Office Poona 1893

Sheep ______ Age ______ Sex, Male. ______ Colour ______

Disease ______ Date of ______ Result ______ Date of Result ______ Register No. ______



5 451)

Hæmatozoon curve
Temperature

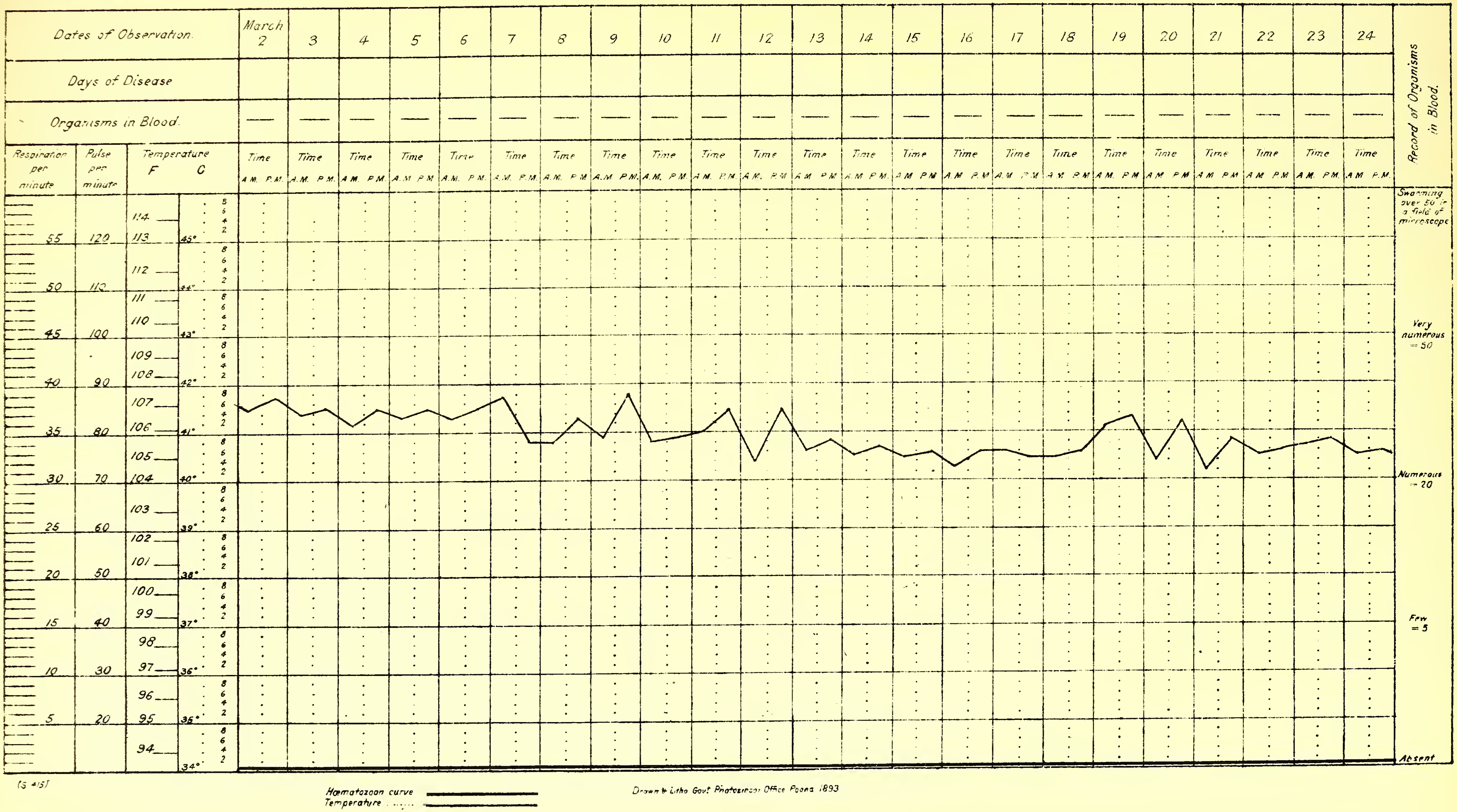
Drawn & Litho. Govt. Photozinco: Office Poona 1893

Age _______ Sex, Male, _______ Colour

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Sheep. Age Sex, Male. Colour

Disease Date of Result Date of Result Register No.



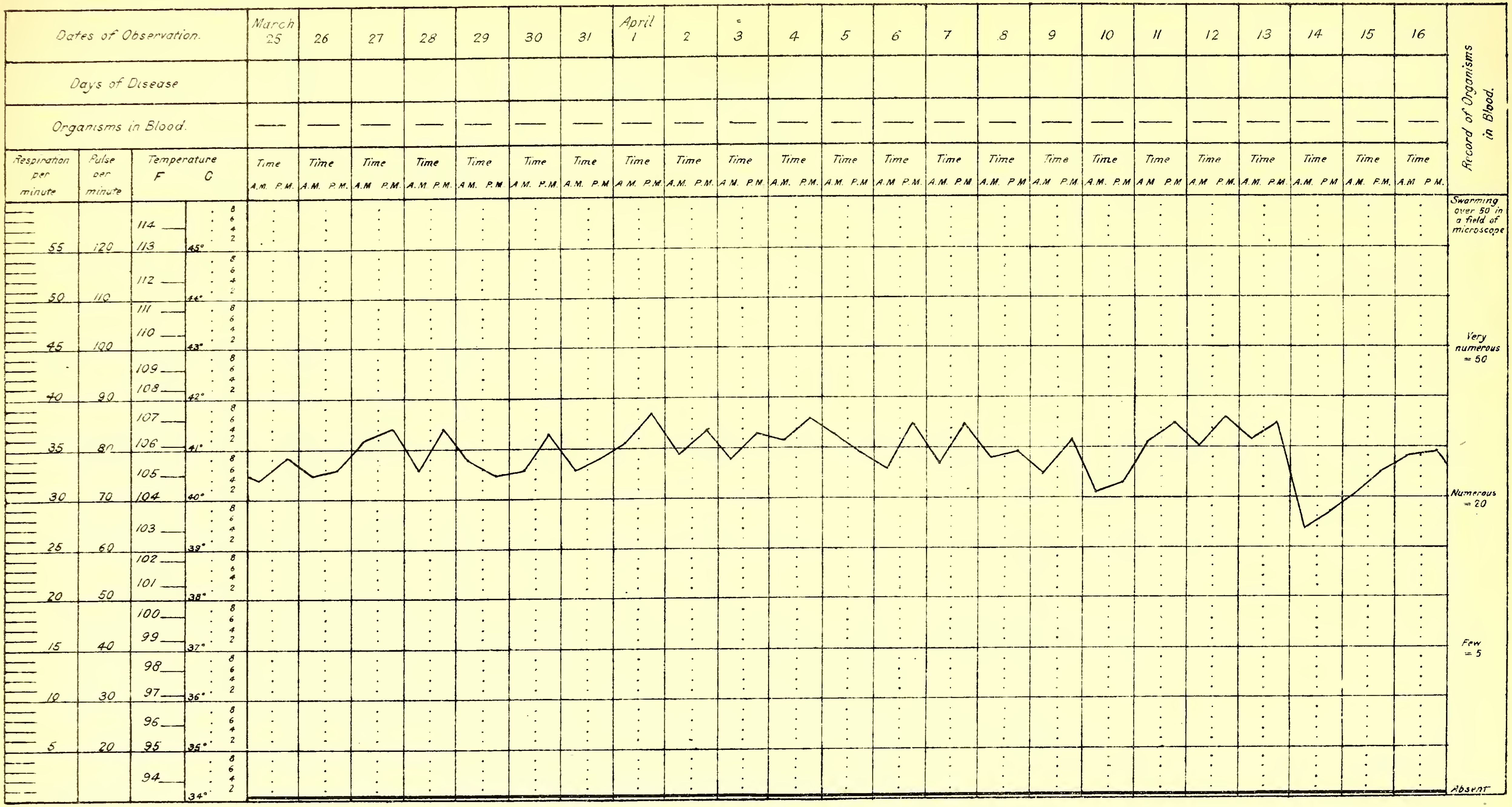
[5 415]

Drawn & Litho Govt. Photozinco: Office Poona 1893

RECORDS OF TEMPERATURE PULSE

Sheep ______ Age ______ Sex, Male. ______ Colour ______

Disease ______ Date of ______ Result ______ Date of Result ______ Register No. ______



(S 45)

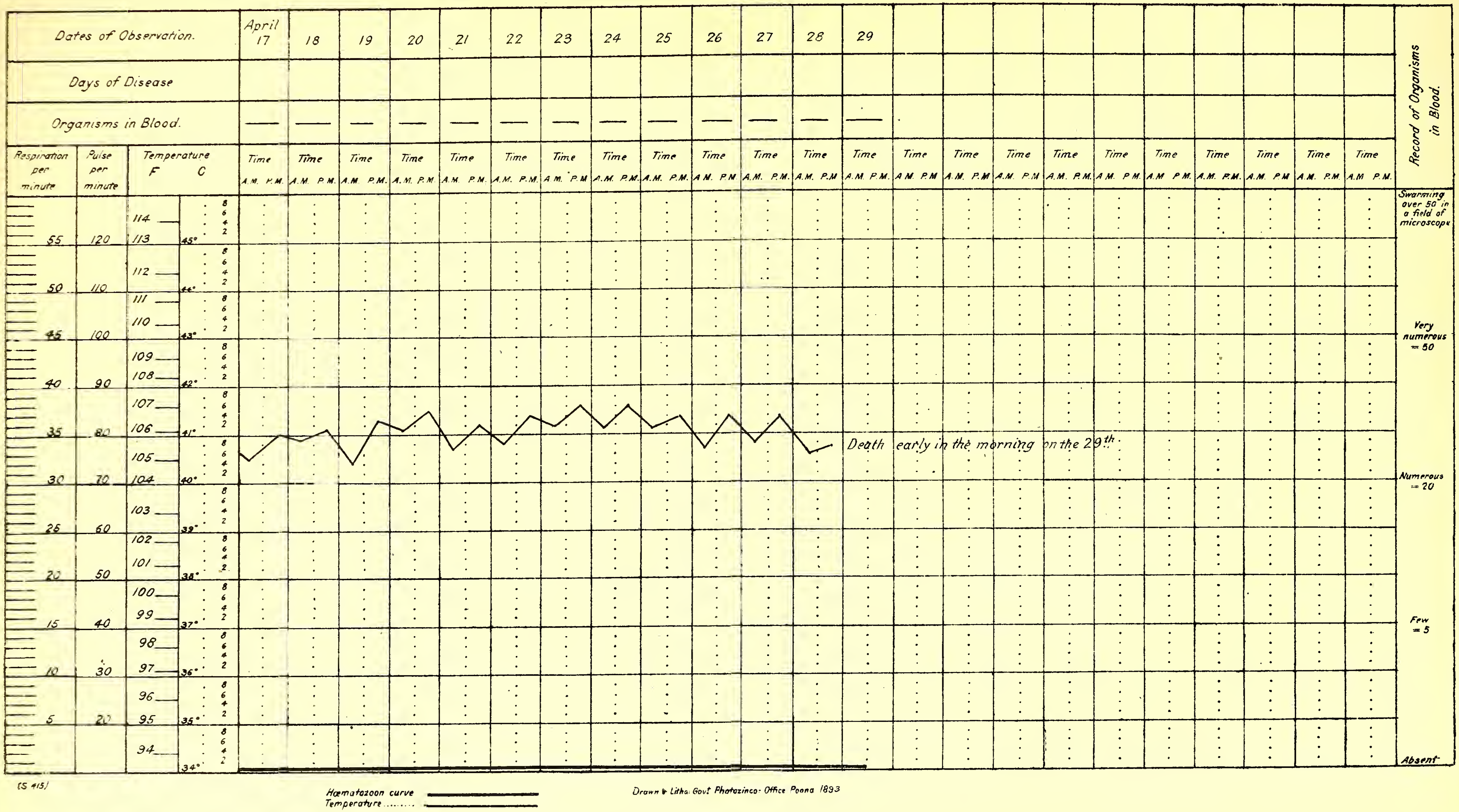
Hæmatozoon curve
Temperature……

Drawn & Lith: Govt. Photozinco: Office Poona 1893

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Sheep ______ Age ______ Sex, Male ______ Colour ______

Disease ______ Date of ______ Result ______ Date of Result ______ Register No. ______



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Drawn & Litho. Govt. Photozinco. Office Poona 1893

1st *April* 1891	—	Temp. A.M. 41·1°C.	P.M. 41·7°C.	No hæmatozoa observed in the blood.
2*nd*	„	Temp. A.M. 40·9°C.	P.M. 41·4°C.	No hæmatozoa observed in the blood.
3*rd*	„	Temp. A.M. 40·8°C.	P.M. 41·3°C.	No hæmatozoa observed in the blood.
4*th*	„	Temp. A.M. 41·2°C.	P.M. 41·6°C.	No hæmatozoa observed in the blood.
5*th*	„	Temp. A.M. 41·3°C.	P.M. 40·9°C.	No hæmatozoa observed in the blood.
6*th*	„	Temp. A.M. 40·6°C.	P.M. 41·5°C.	No hæmatozoa observed in the blood.
7*th*	„	Temp. A.M. 40·8°C.	P.M. 41·5°C.	No hæmatozoa observed in the blood.
8*th*	„	Temp. A.M. 40·8°C.	P.M. 40·9°C.	No hæmatozoa observed in the blood.
9*th*	„	Temp. A.M. 40·5°C.	P.M. 41·2°C.	No hæmatozoa observed in the blood.
10*th*	„	Temp. A.M. 40·1°C.	P.M. 40·3°C.	No hæmatozoa observed in the blood.
11*th*	„	Temp. A.M. 41·1°C.	P.M. 41·5°C.	No hæmatozoa observed in the blood.
12*th*	„	Temp. A.M. 41°C.	P.M. 41·6°C.	No hæmatozoa observed in the blood.
13*th*	„	Temp. A.M. 41·2°C.	P.M. 41·5°C.	No hæmatozoa observed in the blood.
14*th*	„	Temp. A.M. 39·4°C.	P.M. 39·7°C.	No hæmatozoa observed in the blood.
15*th*	„	Temp. A.M. 40°C.	P.M. 40·5°C.	No hæmatozoa observed in the blood.
16*th*	„	Temp. A.M. 40·8°C.	P.M. 40·9°C.	No hæmatozoa observed in the blood.
17*th*	„	Temp. A.M. 40·5°C.	P.M. 41°C.	No hæmatozoa observed in the blood.
18*th*	„	Temp. A.M. 40·9°C.	P.M. 41·1°C.	No hæmatozoa observed in the blood.
19*th*	„	Temp. A.M. 40·4°C.	P.M. 41·3°C.	Patient is now able to get up and walk. No hæmatozoa observed in the blood.
20*th*	„	Temp. A.M. 41·1°C.	P.M. 41·5°C.	There is loss of power on the left side both of the fore and hind limbs but the animal can walk for a distance of ten yards or more without falling. No hæmatozoa observed in the blood.
21*st*	„	Temp. A.M. 40·7°C.	P.M. 41·2°C.	No hæmatozoa observed in the blood.
22*nd*	„	Temp. A.M. 40·8°C.	P.M. 41·4°C.	No hæmatozoa observed in the blood.
23*rd*	„	Temp. A.M. 41·2°C.	P.M. 41·6°C.	No hæmatozoa observed in the blood.
24*th*	„	Temp. A.M. 41·1°C.	P.M. 41·6°C.	No hæmatozoa observed in the blood.
25*th*	„	Temp. A.M 41·5°C.	P.M. 41·4°C.	No hæmatozoa observed in the blood.
26*th*	„	Temp. A.M. 40·7°C.	P.M. 41·4°C.	No hæmatozoa observed in the blood.
27*th*	„	Temp. A.M. 40·8°C.	P.M. 40·4°C.	No hæmatozoa observed in the blood.
28*th*	„	Temp. A.M. 40·6°C.	P.M. 40·8°C.	No hæmatozoa observed in the blood.
29*th*	„	Death in the early morning.		

AUTOPSY at 9-30 A.M., *April 29th*, 1891.—Body somewhat emaciated. Left knee-joint increased in size and tense, but there is no fluid in it. *On section* of the trachea a considerable quantity of a white frothy fluid escapes. There is no fluid in the pleural cavities. No adhesions of the pleuræ.

Lungs.—Are darkish red in colour. There is some emphysema of both inferior borders of the anterior lobes near the apices. No consolidation. *On section* and the application of slight pressure much frothy mucus exudes from the cut surfaces, but it is not blood-stained.

Heart.—There is no fluid in the cavity of the pericardium. The valves appear normal. No extravasations in any of the cavities.

Liver.—Is small, weighs 11 ounces; apparently normal in structure; lying on Glisson's capsule on the right lobe is a hydatid cyst and on the under-surface of the diaphragm a small semi-solid tumor, which on section is found to contain a yellow paint-like material. Microscopically it is found to be made up of unrecognisable debris but nothing like the Surra hæmatozoon could be discovered in it.

Spleen.—Is very small. The *kidneys* are small, but are both healthy. *Stomach.* Nothing abnormal.

Brain.—Vessels congested and the convolutions flattened.

Both lateral ventricles contain fluid; the right is much the larger and contains more fluid than the left; the substance of the right hemisphere is considerably thinned by the pressure of the contained fluid. No hæmatozoa were detected in this fluid.

Remarks:—This animal was subcutaneously inoculated with ·8c.c. of blood containing a few hæmatozoa taken from the Jugular Vein of Horse No. VII.

The hæmatozoon being still absent from the blood fourteen days later, the animal was re-inoculated with 1c.c. of blood containing a few hæmatozoa from Horse No. IV. On the 28th day after the re-inoculation, fluid was observed to be present in the right tunica vaginalis testis, and on the 45th day, there was in addition a discharge of muco-purulent material from the right nostril. The hæmatozoon was absent from the nasal fluid, but present in that drawn from tunica vaginalis on the same date. It continued however to be absent from the blood. On the 105th day after the re-inoculation, the animal presented symptoms of loss of power on the left side, involving both fore and hind limbs, but it could walk for a short distance without falling.

During the whole interval from the first inoculation to the date of death, covering a period of 127 days, the hæmatozoon was never discovered in the blood, although it was found on the 45th day in the fluid from the left tunica vaginalis testis.

It is a point of extreme interest that even in the absence of the hæmatozoon, such grave cerebral symptoms presented themselves and were accounted for at the Autopsy by the amount of fluid in the lateral ventricles, especially the right. On the eighteenth day after re-inoculation as the hæmatozoon had not been discovered in the blood, it was decided to inoculate two Guinea-pigs with blood from the animal, in order to prove whether the organism existed in any form in the general circulation. This accordingly was done, and each animal received subcutaneously ·7c.c. of blood drawn from the ear of the sheep. In the case of one Guinea-pig, the hæmatozoon appeared in the blood in ten, and in the other after an interval of fourteen days. Eventually death took place in the former after 58 days, and in the latter 139 days after inoculation.

It is, therefore, clinically a point of supreme importance to bear in mind, that the blood of a sheep previously inoculated with the hæmatozoon of horse Surra, may at a much later period contain, although probably impossible of demonstration, the particulate contagium which on being introduced into the circulation of another animal, has the power of reproducing the disease.

No. 1.—GUINEA-PIG.

Month and Date.	No. 1 Guinea Pig. Condition of blood.	Temperature. ° C.		Month and Date.	No. 1 Guinea-Pig. Condition of blood.	Temperature. ° C.	
		A. M.	P. M.			A. M.	P. M.
1891.							
January.				February.			
24th...	Inoculated	...	39·2	23rd...	Hæmatozoa numerous ...	38·4	38·7
25th...	......	39·4	39·8	24th...	" " ...	39·1	39·4
26th...	......	39·4	39·8	25th...	" " ..	39·1	39·4
27th...	......	38·6	39·6	26th...	" very " ...	38·8	38·9
28th...	......	39·5	39·8	27th...	" " " ...	38·7	40·5
29th...	......	39·5	38·1	28th...	" " " ...	40·1	40·2
30th...	......	38·2	38·9	March.			
31st ...	......,	38·7	37·9	1st ...	" " " ...	39·3	39·5
February.				2nd. .	" " " ...	39·1	39·3
1st ...	.....,	38·6	39·	3rd...	" " " ...	38·7	39·9
2nd. .	Hæmatozoa absent ...	38·6	38·7	4th...	" " " ..	38·9	39·3
3rd...	" one	38·	39·	5th...	" " " ...	39·1	39·4
4th...	" numerous ...	38·8	39·8	6th...	" " " ...	39·2	39·5
5th...	" absent ...	39·6	39·5	7th...	" numerous ...	39·3	39·6
6th...	" numerous ...	39·	39·2	8th...	" " ...	39·4	39·7
7th...	" absent ...	39·	39·2	9th...	" " ...	39·5	39·8
8th...	" " ...	39·1	39·3	10th...	" " ...	39·7	39·8
9th...	" sparsely numerous .	37·8	37·9	11th...	" " ...	39·7	39·8
10th...	" very " ...	38·8	38·9	12th...	" " ...	39·1	39·4
11th...	" swarming ...	38·7	38·9	13th...	" swarming ...	39·8	39·8
12th...	" very numerous ...	38·7	38·8	14th...	" very numerous ...	39·7	39·8
13th...	" few	38·5	38·8	15th...	" " " ...	39·3	39·5
14th...	" very numerous ...	39·2	39·5	16th...	" " " ...	39·4	39·7
15th...	" " " ...	38·6	38·8	17th...	" swarming ...	39·6	39·8
16th...	" " " ...	38·6	38·8	18th...	" " ...	40·2	40·2
17th...	" " " ...	39·3	39·5	19th...	" " ...	40·1	40·3
18th...	" absent ...	39·3	39·4	20th...	" " ...	40·2	40·3
19th...	" " ...	39·3	39·5	21st...	" " ...	39·6	39·8
20th...	" numerous ...	38·8	38·9	22nd. .	" " ...	39·7	39·8
21st ...	" few	38·6	38·7	23rd...	" " ...	39·2	39·7
22nd. .	" numerous ...	38·4	38·6				

Death at 2 P.M.

Inoculated 24th January 1891, at 11-30 A.M.
Died 23rd March 1891, at 2-0 P.M.
58 days 2¼ hours after inoculation.

AUTOPSY.—The animal is somewhat emaciated.

The pleural cavities are free from fluid, as also the peritoneal.

Lungs.—Pale in colour and large, filling up the whole cavity of the chest; a few petechiæ dotted over the surface of the organs.

Heart.—Is distended in all its cavities by coloured blood clots and presents numerous ecchymoses on its anterior and posterior surfaces.

Liver.—Large, but healthy looking.

Kidneys.—Dotted over with small petechiæ, capsules strip easily.

Spleen.—Much enlarged, weighs 4 grammes (60 grs.)

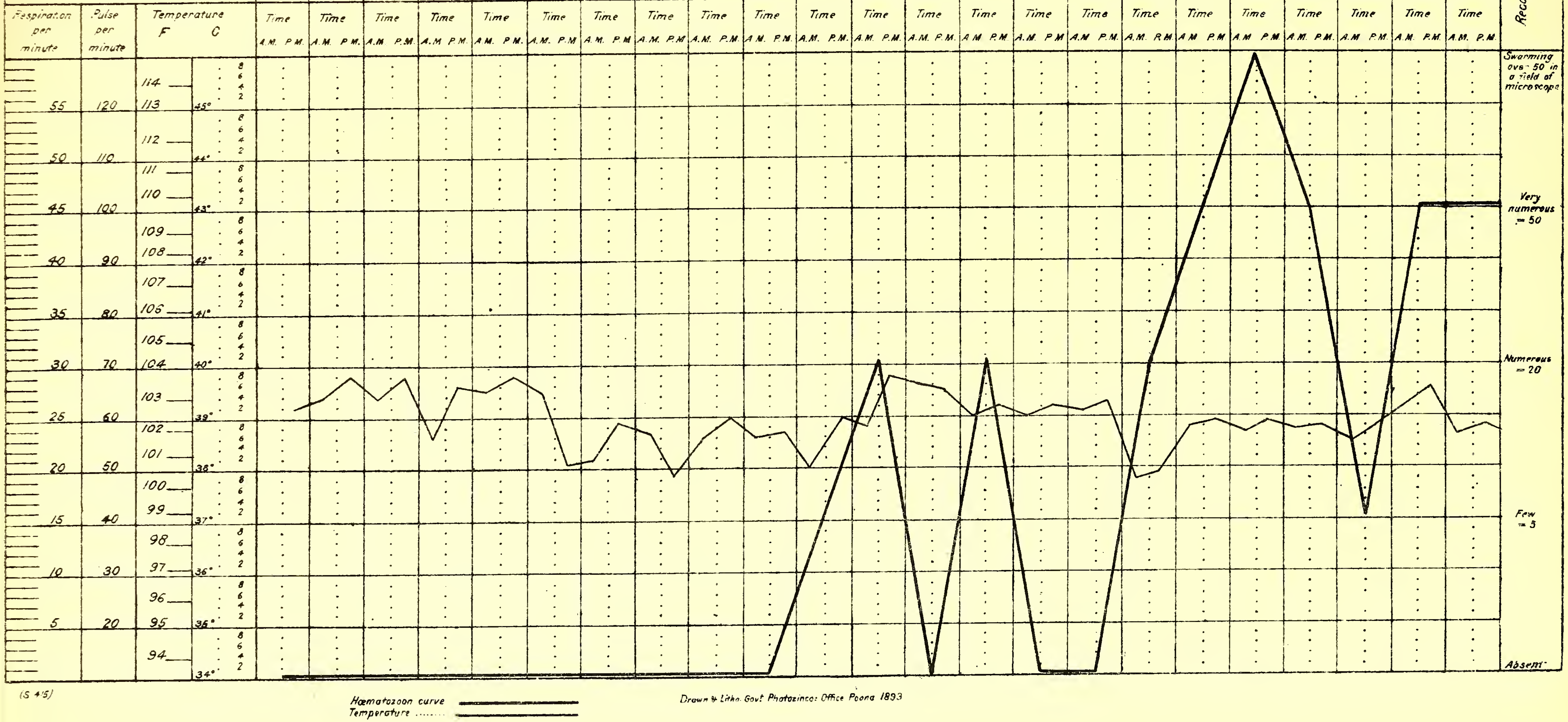
Bladder.—Normal to naked eye.

RECORDS OF TEMPERATURE PULSE AND RESPIRATION

Guinea Pig Subcutaneously inoculated with 0·7 cc of blood from Sheep. (Hæmatozoon absent) Age ____ Sex ____ Colour ____

Disease Surra Date of Inoculation 24 1·91 Result Death Date of Result 23·3·91 Register No. I

Dates of Observation.	Jan.y 24	25	26	27	28	29	30	31	Febr.y 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Days of Disease											1	2	3	4	5	6	7	8	9	10	11	12	13
Organisms in Blood	—	—	—	—	—	—	—	—	—	—	F	N	—	N	—	—	N	VN	S	VN	F	VN	VN



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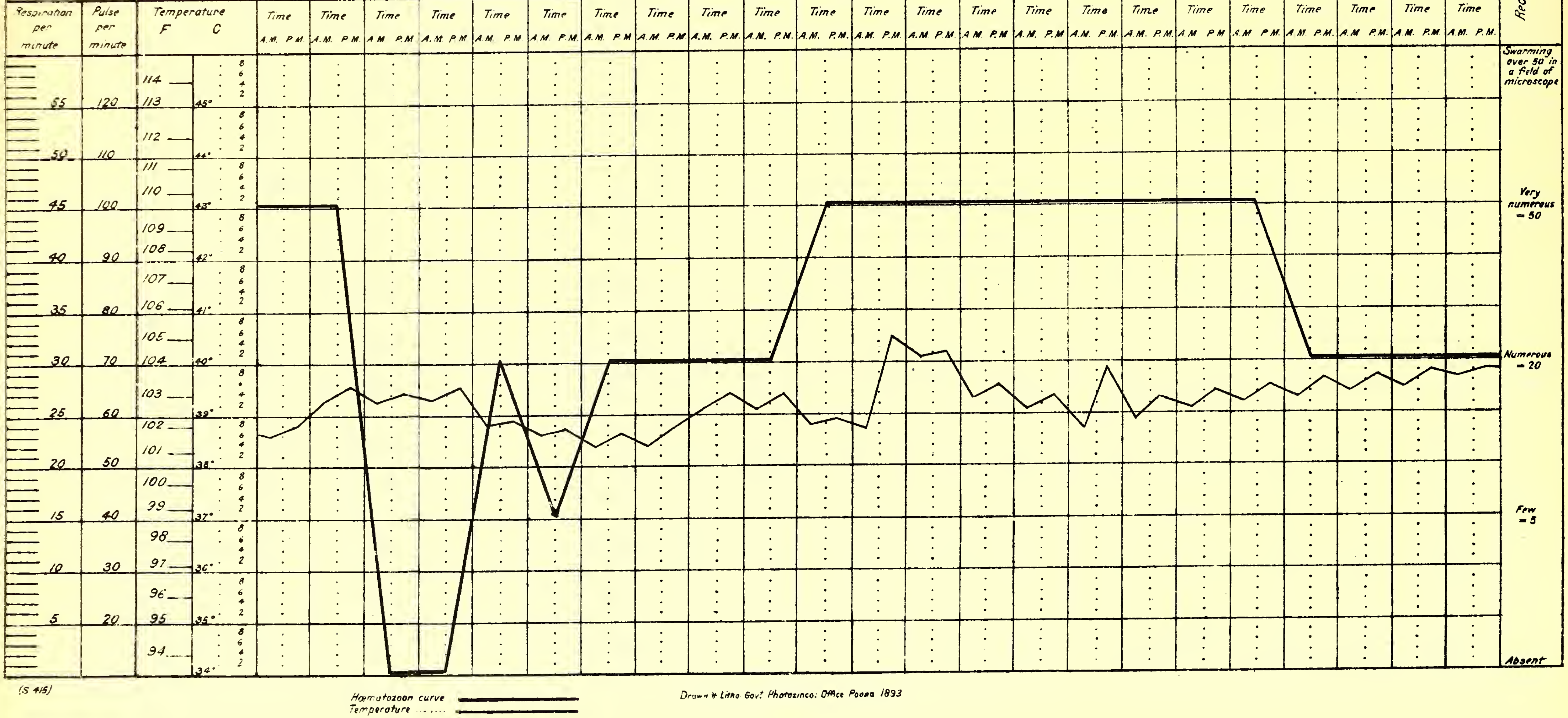
Age ________ Sex ________ Colour ________

Disease ________ Date of ________ Result ________ Date of Result ________ Register No. ________

Dates of Observation.	Febr.y 16	17	18	19	20	21	22	23	24	25	26	27	28	Mar: 1	2	3	4	5	6	7	8	9	10
Days of Disease	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Organisms in Blood	VN	VN	—	—	N	F	N	N	N	N	VN	VN	VN	VN	VN	VN	VN	VN	VN	N	N	N	N



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RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

__________ Age ______ Sex ______ Colour ______

Disease ______ Date of ______ Result ______ Date of Result ______ Register No. ______

Dates of Observation	Mar. 11	12	13	14	15	16	17	18	19	20	21	22	23										Record of Organisms in Blood.
Days of Disease	37	38	39	40	41	42	43	44	45	46	47	48	49										
Organisms in Blood.	N	VN	S	VN	VN	VN	S	S	S	S	S	S	S										
Respiration per minute / Pulse per minute / Temperature F C	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	

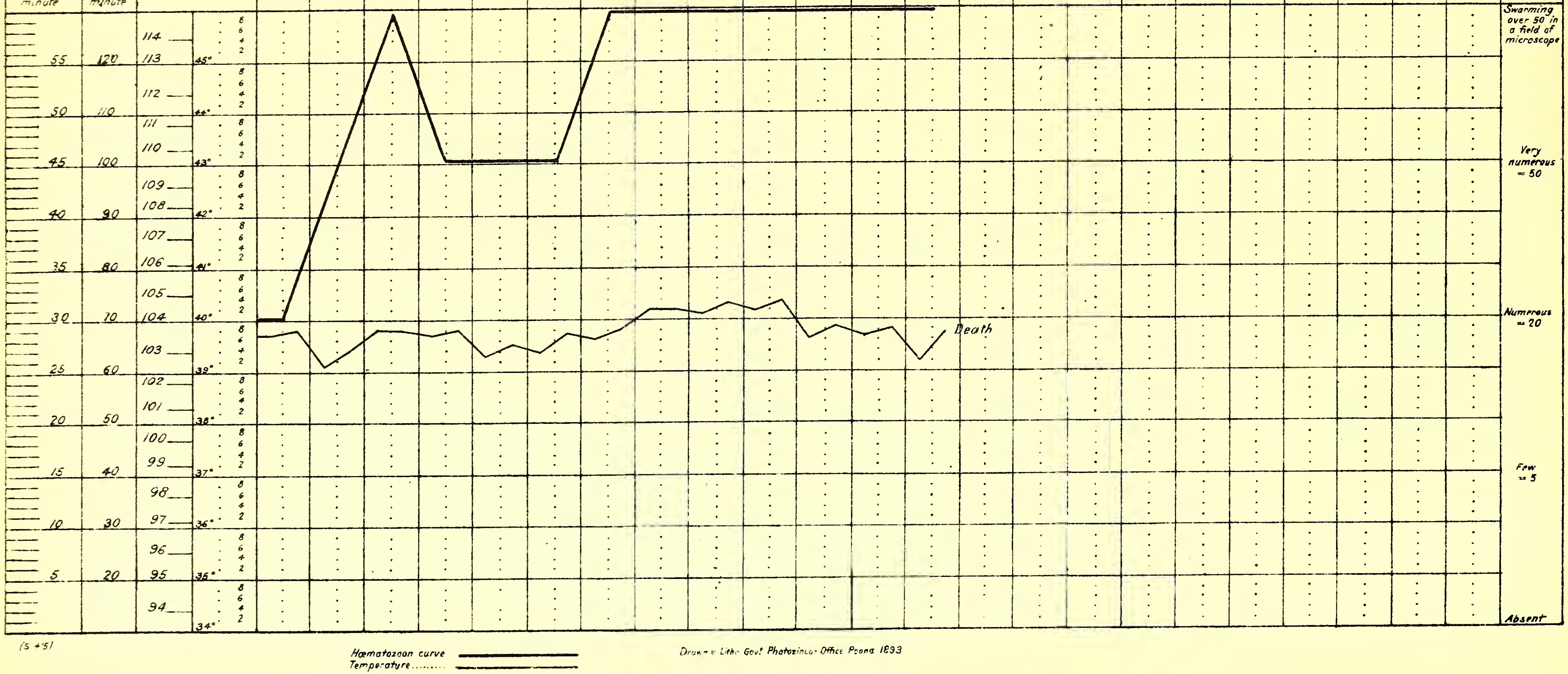

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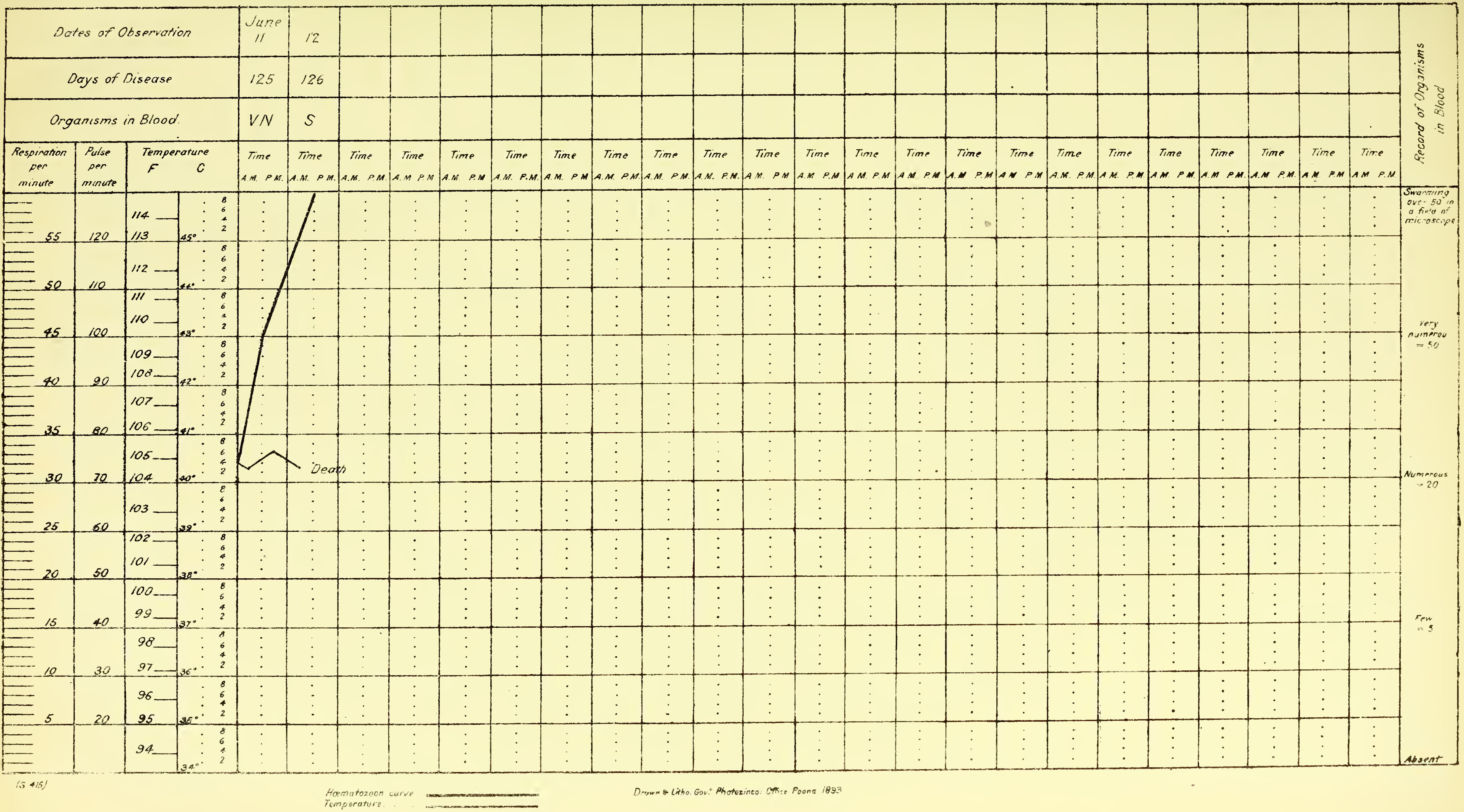
Chart VII.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age ______ Sex ______ Colour ______

Disease ______ Date of ______ Result ______ Date of Result ______ Register No. ______



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RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age ______ Sex ______ Colour ______

Disease ______ Date of ______ Result ______ Date of Result ______ Register No. ______

Dates of Observation.	May 19	20	21	22	23	24	25	26	27	28	29	30	31	June 1	2	3	4	5	6	7	8	9	10
Days of Disease	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124
Organisms in Blood.	F	F	F	—	F	F	—	F	F	—	—	—	—	—	F	F	—	F	F	F	F	F	F

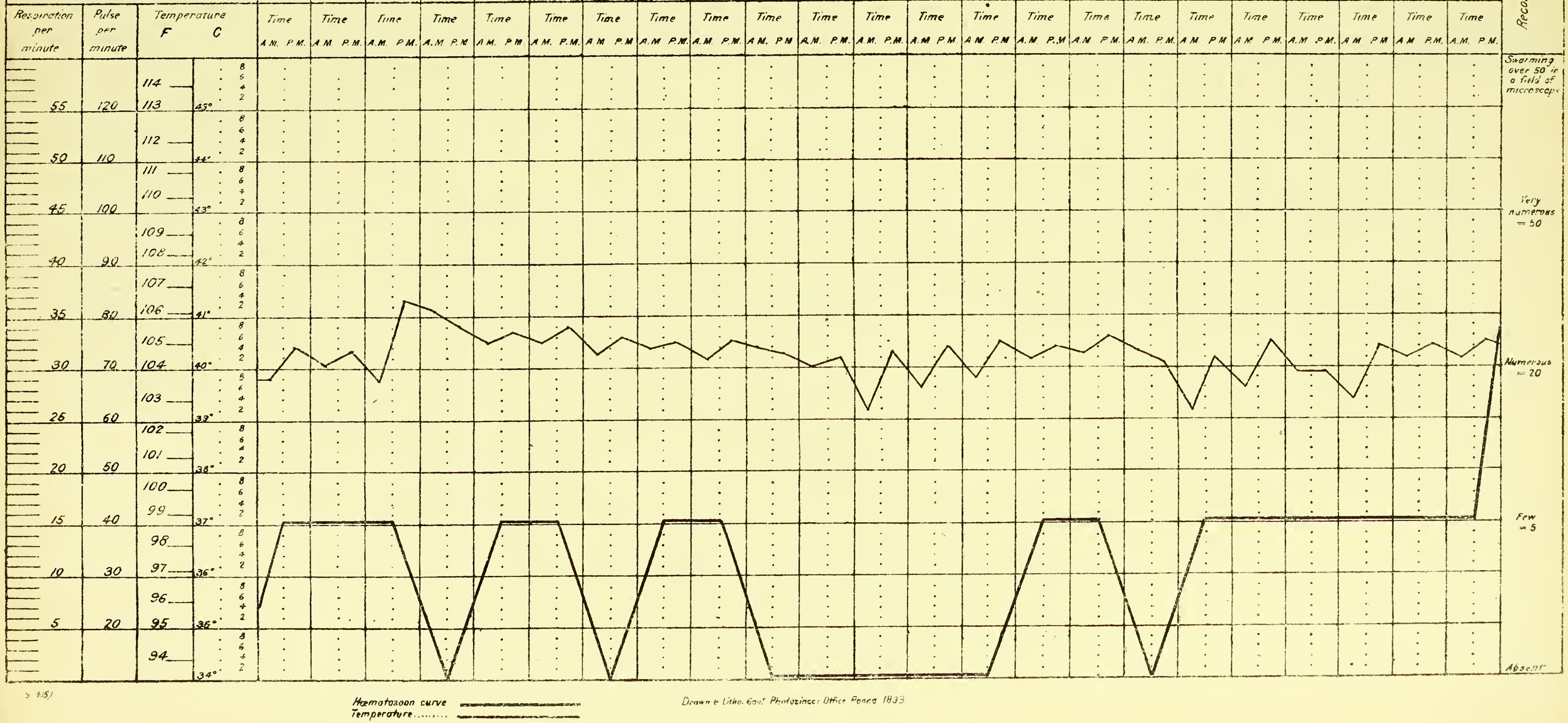

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Chart V.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age ______ Sex ______ Colour ______

Disease ______ Date of ______ Result ______ Date of Result ______ Register No. ______

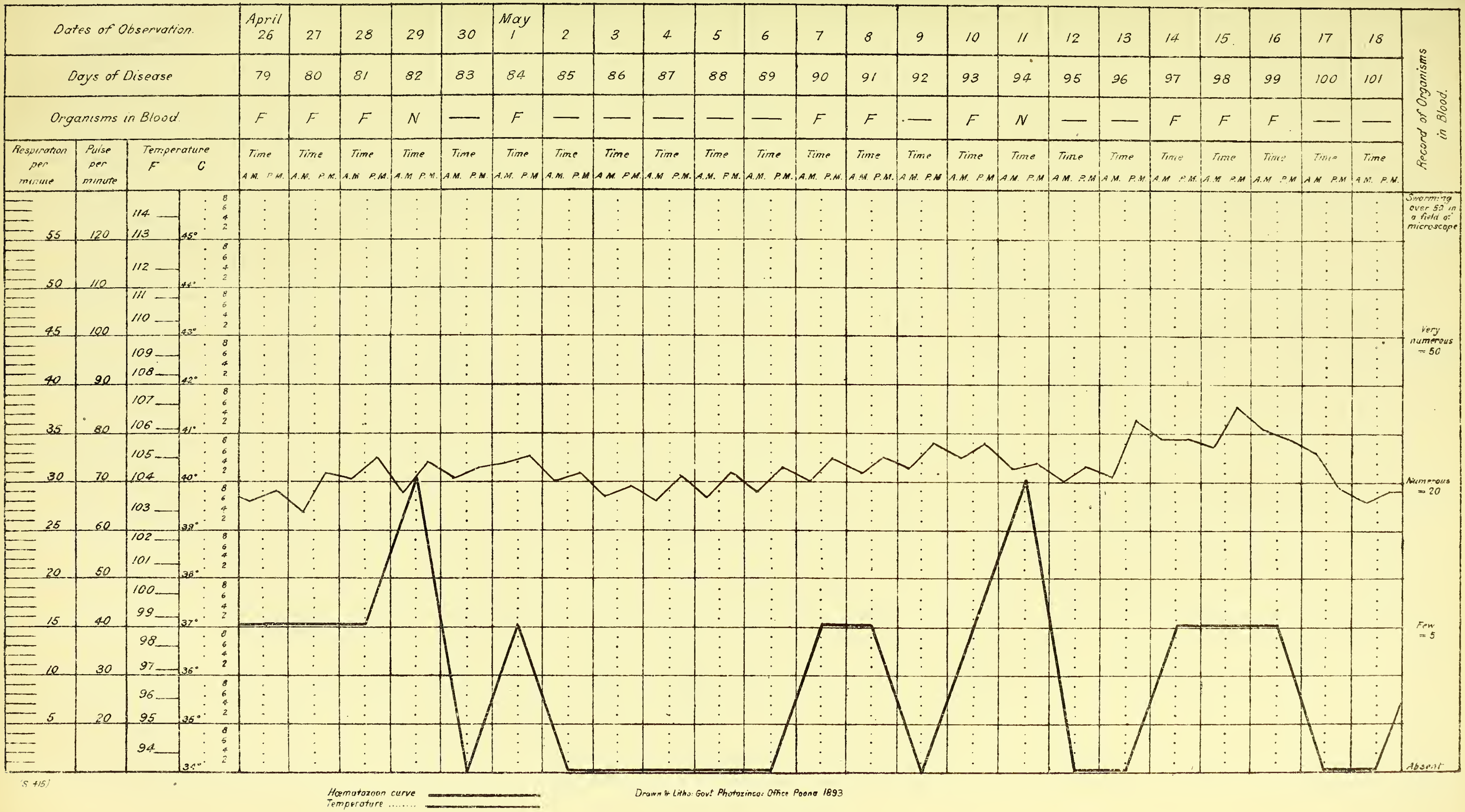

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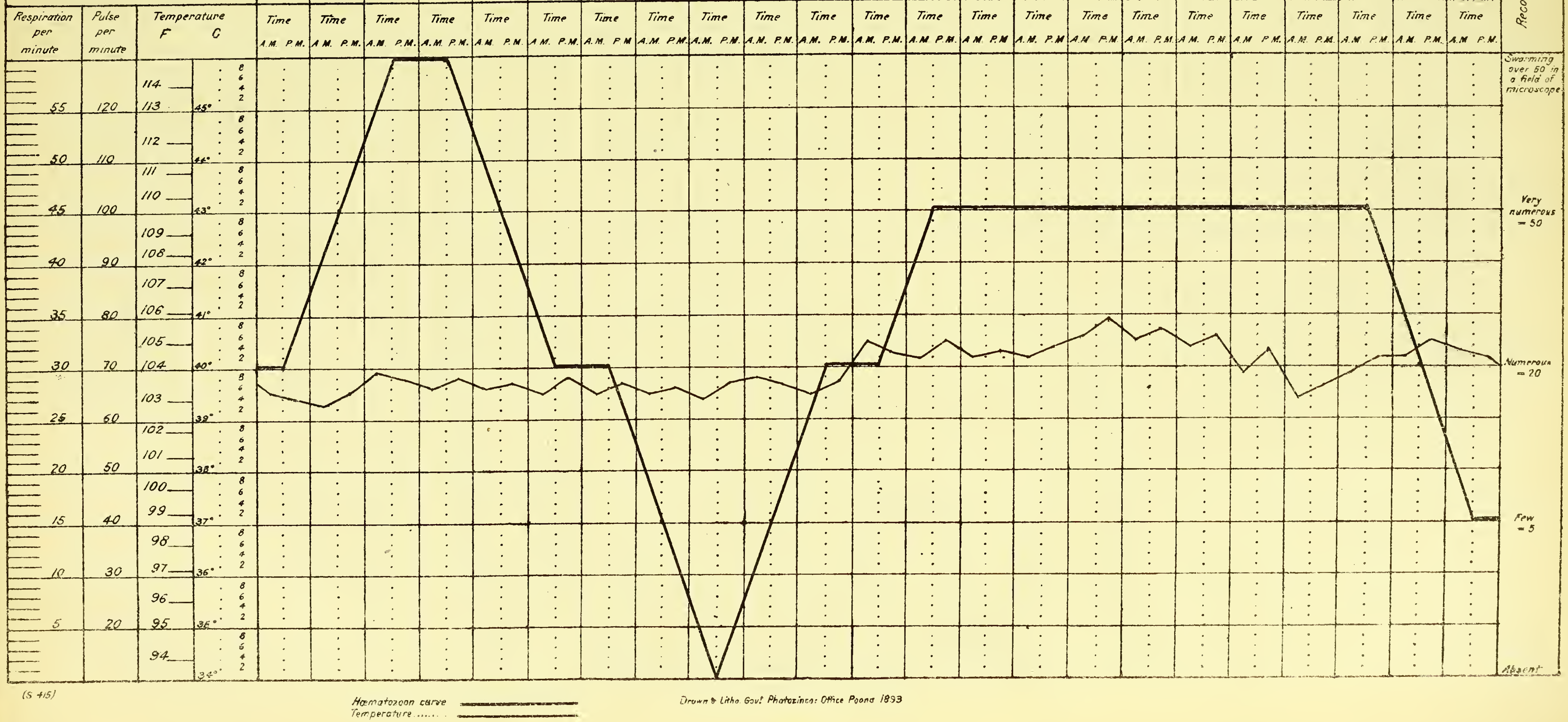
Chart IV.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

______ Age ______ Sex ______ Colour ______

Disease ______ Date of ______ Result ______ Date of Result ______ Register No. ______

Dates of Observation.	April 3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Days of Disease	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78
Organisms in Blood	N	VN	S	S	VN	N	N	F	—	F	N	N	VN	·VN	VN	VN	VN	VN	VN	VN	VN	N	F



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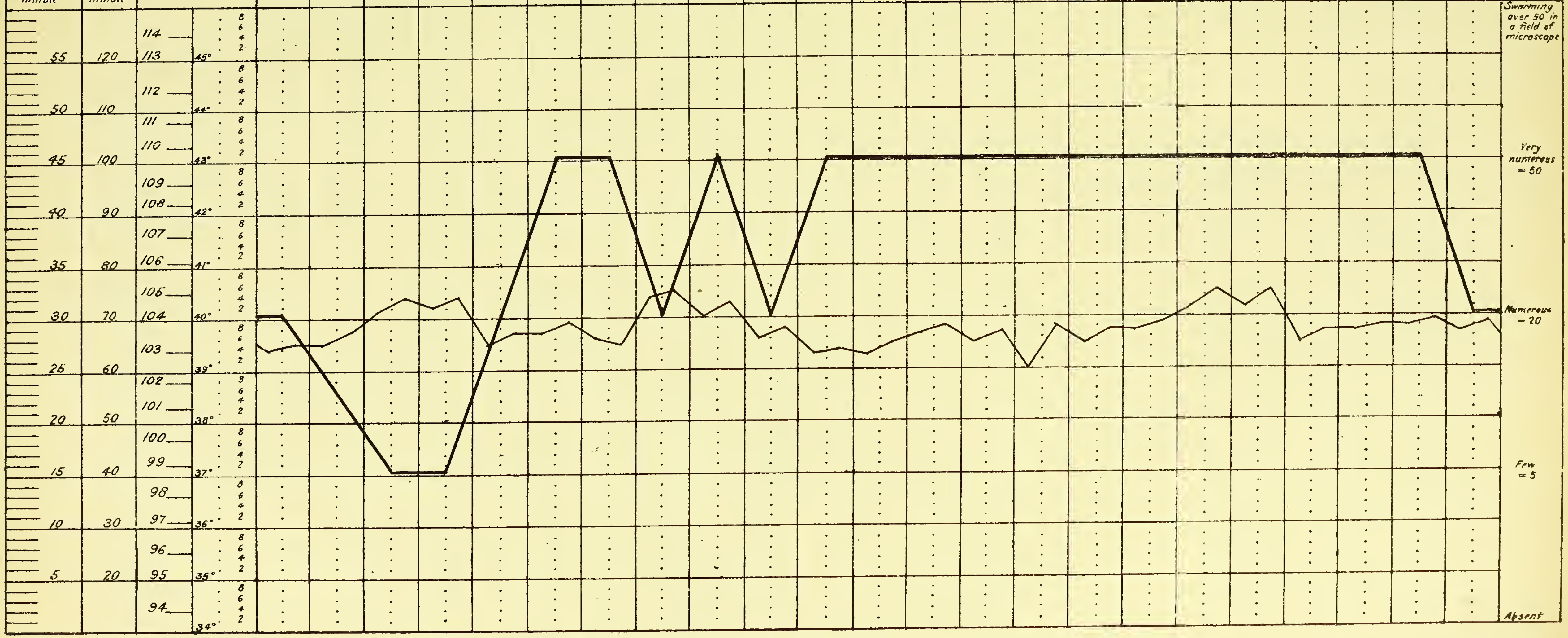
RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age _____ Sex _____ Colour _____

Disease _____ Date of _____ Result _____ Date of Result _____ Register No. _____

Dates of Observation.	March 11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	April 1	2
Days of Disease	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55
Organisms in Blood	N	·	F	F	N	VN	VN	N	VN	N	VN	VN	VN	VN	VN	VN	VN	VN	VN	VN	VN	VN	N
Respiration per minute / Pulse per minute / Temperature F C	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.



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Hæmatozoon curve
Temperature ....

Drawn & Litho: Gov.t Photozinco: Office Poona 1893

Chart II.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

________ Age ________ Sex ________ Colour ________

Disease ________ Date of ________ Result ________ Date of Result ________ Register No. ________

Dates of Observation.	Febr.y 16	17	18	19	20	21	22	23	24	25	26	27	28	March 1	2	3	4	5	6	7	8	9	10
Days of Disease	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
Organisms in Blood.	N	N	VN	VN	VN	VN	VN	VN	VN	VN	N	N	N	N	N	N	N	N	N	N	N	N	N

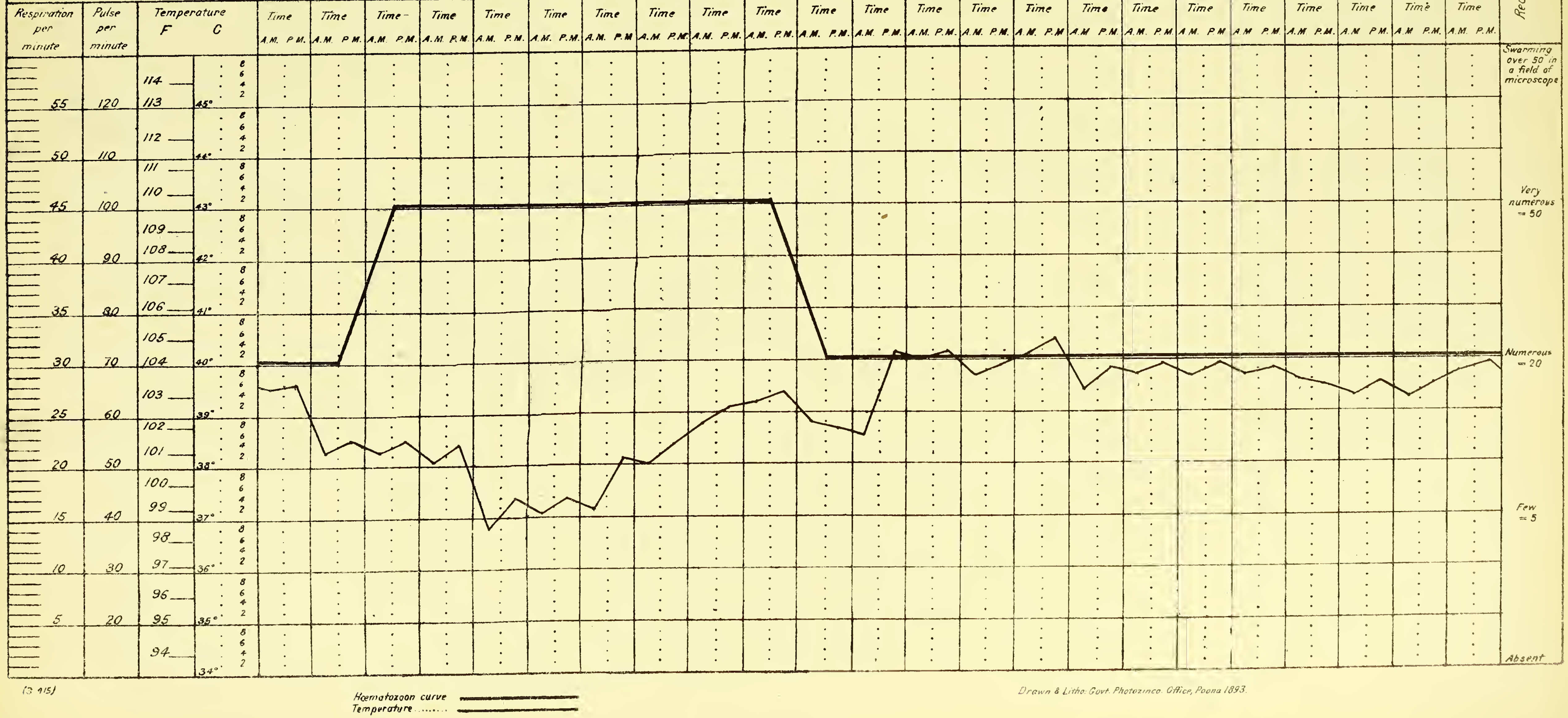

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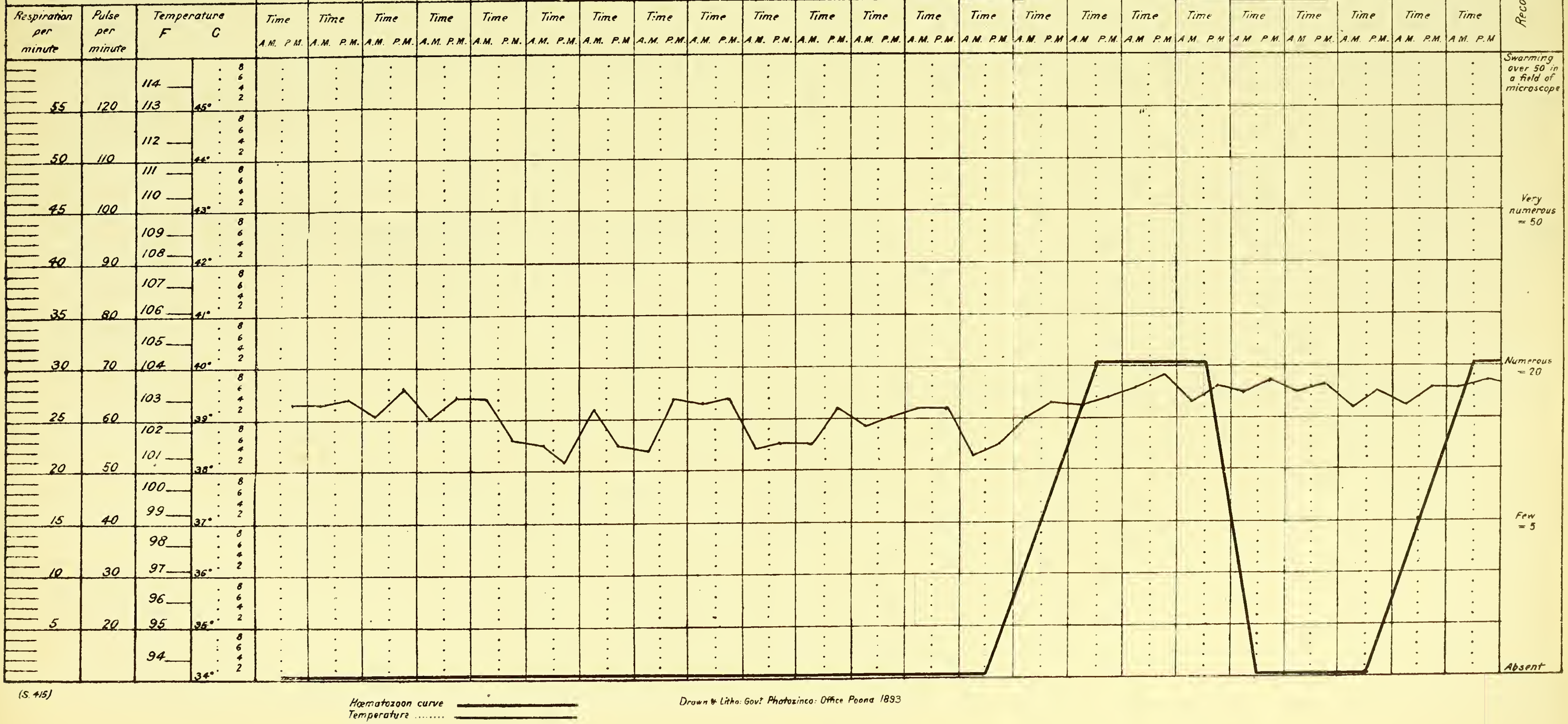
Chart I.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Guinea Pig. Subcutaneously Inoculated with 0·7cc of blood from Sheep (hæmatozoon absent) Age Sex Colour

Disease, "Surra." **Date of** Inoculation, 24 . 1 . 91 **Result,** Death. **Date of Result,** 12 . 6 . 91. **Register No.** II.

Dates of Observation.	Jan.y 24.	25	26	27	28	29	30	31	Feb.y 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Days of Disease	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	2	3	4	5	6	7	8	9
Organisms in Blood.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	F	N	N	N	—	—	—	F	N



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No. 2.—GUINEA PIG. Inoculated with 0·7 c. c. of blood taken from Sheep No. I.

Month and date.	Condition of blood.	Temperature. oC. A.M.	Temperature. oC. P.M.
1891.			
January 24 ...	Inoculated at 11·30 A.M.		39·3
25 ...		39·3	39·4
26 ...		39·1	39·6
27 ...		39	39·4
28 ...		39·4	38·6
29 ...		38·5	38·2
30 ...		39·2	38·5
31 ...		38·4	39·4
February 1 ...		39·3	39·4
2 ...	Hæmatozoa absent .	38·4	38·5
3 ..	„ „ ...	38·5	39·2
4 ...	„ „ ...	38·9	39
5 ...	„ „ ...	39·2	39·2
6 ...	„ „ ...	38·3	38·5
7 ...	Hæmatozoon one ...	39	39·3
8 ...	Hæmatozoa numerous.	39·3	39·4
9 ...	„ „	39·6	39·8
10 ...	„ „	39·3	39·6
11 ...	„ absent.	39·5	39·7
12 ...	„ „	39·5	39·6
13 ...	„ „	39·2	39·5
14 ...	„ few ...	39·3	39·6
15 ...	„ numerous.	39·6	39·7
16 ...	„ „	39·5	39·6
17 ...	„ „	38·3	38·5
18 ...	„ very numerous.	38·3	38·5
19 ...	„ numerous.	38·1	38·4
20 ...	„ „	36·8	37·4
21 ...	„ „	37·1	37·4
22 ...	„ „	37·2	38·1
23 ...	„ „	38	38·4
24 ...	„ „	38·8	39·1
25 ...	„ „	39·2	39·4
26 ...	„ „	38·8	38·7
27 ...	„ „	38·6	40·1
28 ...	„ „	40	40·1
March 1 ...	„ „	39·7	39·9
2 ...	„ „	40·1	40·3
3 ...	„ „	39·5	39.8
4 ...	„ „	39·7	39·9
5 ...	„ „	39·7	39·9
6 ...	„ „	39·7	39·8
7 ...	„ „	39·6	39·5
8 ...	„ „	39·3	39·5
9 ...	„ „	39·3	39·5
10 ...	„ „	39·8	39·9
11 ...	„ „	39·4	39·5
12 ...	Blood not examined.	39·5	39·7
13 ...	Hæmatozoa few ...	40·1	40·3
14 ...	„ „ ...	40·2	40·4
15 ...	„ numerous.	39·5	39·7
16 ...	„ very numerous.	39·7	39·9
17 ...	„ „	39·6	39·5
18 ...	„ numerous.	40·4	40·5
19 ...	„ very numerous.	40	40·3
20 ..	„ numerous.	39·6	39·8
21 ...	„ very numerous.	39·3	39·4
22 ...	„ „	39 3	39·5
23 ...	„ „	39·7	39·8
24 ...	„ „	39·5	39·7
25 ...	„ „	39	39·8
26 ...	„ „	39·5	39·7
27 ...	„ „	39·8	39·9
28 ...	„ „	40·2	40·5
29 ...	„ „	40·2	40·5
30 ...	„ „	39·5	39·7
31 ...	„ „	39·7	39·8
April 1 ...	„ „	39·8	39·9
2 ...	„ numerous.	39·7	39·8
3 ...	„ „	39·5	39·4
April 4 ...	Hæmatozoa very numerous.	39·3	39·5
5 ...	„ swarming.	39·9	39·8
6 ...	„ „	39·6	39·8
7 ...	„ very numerous.	39·6	39·7
8 ...	„ „	39·5	39·8
9 ...	„ numerous.	39·5	39·7
10 ...	„ „	39·5	39·6
11 ..	„ few ...	39·4	39·7
12 ...	„ absent.	39·8	39·7
13 ..	„ few ...	39·5	39·7
14 ...	„ numerous.	40·5	40·3
15 ...	„ „	40·2	40·5
16 ...	„ very numerous.	40·2	40·3
17 ...	„ „	40·2	40·4
18 ...	„ very numerous.	40·6	40·9
19 ...	„ „	40·5	40·7
20 ...	„ „	40·4	40·8
21 ...	„ „	39·9	40·3
22 ...	„ „	39·4	39·6
23 ...	„ „	39·9	40·2
24 ...	„ numerous.	40 2	40·5
25 ...	„ few ...	40·3	40·2
26 ...	„ „ ...	39·6	39·8
27 ...	„ „ ...	39·4	40·2
28 ...	„ „ ..	40·1	40·5
29 ...	„ numerous.	39·8	40·4
30 ...	„ absent.	40·1	40·3
May 1 ...	„ few ...	40·4	40·5
2 ...	„ absent.	40	40·2
3 ...	„ „	39·7	39·9
4 ...	„ „	39·6	40·1
5 ...	„ „	39·7	40·2
6 ...	„ „	39·8	40·3
7 ...	„ few ...	40	40·5
8 ...	„ „ ..	40·2	40·5
9 ...	„ absent.	40·3	40·8
10 ..	„ few ...	40·5	40·7
11 ...	„ numerous.	40·3	40·4
12 ...	„ absent.	40	40·3
13 ...	„ „	40·1	41·3
14 ...	„ few ...	40·9	40·9
15 ...	„ „ ...	40·7	41·5
16 ...	„ „ ...	41·1	39·9
17 ..	„ absent.	40·6	39·9
18 ...	„ „	39·6	39·8
19 ...	„ few ...	39·8	40·4
20 ...	„ „ ...	40·1	40·3
21 ...	„ „ ...	39·8	41·3
22 ...	„ absent.	41·1	40·8
23 ...	„ few ...	40·5	40.7
24 ...	„ „ ...	40·5	40·8
25 ...	„ absent.	40·3	40·6
26 ...	„ few ...	40·4	40 5
27 ...	„ „ ...	40·2	40·5
28 ...	„ absent.	40·4	40·3
29 ...	„ „	40	40·2
30 ...	„ „	39·2	40·3
31 ...	„ „	39·6	40·4
June 1 ...	„ „	39·8	40·5
2 ...	„ few ...	40·2	40·4
3 ...	„ „	40·3	40·6
4 ...	„ absent.	40·3	40·1
5 ...	„ few ...	39·2	40·2
6 ...	„ „	39·6	40·5
7 ...	„ „	39·9	39·9
8 ...		39·4	40·4
9 ...	„ few ...	40·2	40·4
10 ...	„ „ ...	40·2	40·5
11 ...	„ very numerous.	40·3	40·6
12 ...	„ swarming.	40·3	Death.

CASE No. I.—MALE GOAT.

4th November 1890, 9 A.M.—Inoculated this animal in the Right Inguinal Region with ·5 c. c. blood, swarming with hæmatozoa, from Horse No. II. Temp. P.M. 39·6°C. The Temp. fluctuated between 38·8°C. and 40·1°C. until the morning of the 9th when it was 40°C.; at 5 P.M. the Temp. was 40·2°C.; up to this date no hæmatozoa were found in the blood.

10th.—Temp. A.M. 42·2°C. The serous fluid taken from the seat of inoculation was found to contain a few hæmatozoa active in their movements. About 30 were seen in one preparation of blood.

11th.—Two specimens of blood were examined from the ear; in one no hæmatozoa were discovered, but in the second several torpid ones were observed.

12th.—In three cover glass specimens of blood taken from the ear, no hæmatozoa were found. In two cover glass specimens of blood taken from the seat of inoculation, a few hæmatozoa were observed.

13th.—There is no œdema at the seat of inoculation and no hæmatozoa in the serum or blood specimens.

14th.—Temp. A.M. 39·2°C. One hæmatozoon found in two specimens of blood.

15th.—Temp. A.M. 40·6°C. Two specimens of blood were examined; no hæmatozoa seen. Temp. P.M. 41·8°C.

16th.—Temp. A.M. 40·5°C. Three specimens of blood carefully examined; no hæmatozoa seen. Temp. P.M. 39·8°C.

17th.—Temp. A.M. 40·8°C. Two hæmatozoa only seen in three specimens of blood. Temp. P.M. 41·°C.

18th.—Temp. A.M. 39·4°C. One hæmatozoon found. Temp. P.M. 40·3°C.

19th.—Temp. A.M. 41·5°C. Hæmatozoa numerous but torpid. Temp. P.M. 41·8°C.

20th.—Temp. A.M. 41·9°C. No hæmatozoa in three blood preparations. Temp. P.M. 41·1°C.

21st.—Temp. A.M. 39·3°C. No hæmatozoa in the blood. Temp. P.M. 40·3°C.

22nd.—Temp. A.M. 39·6°C. No hæmatozoa seen. Temp. 40·9°C.

23rd.—Temp. A.M. 40·3°C. No hæmatozoa in the blood. Temp. P.M. 39·5°C.

24th.—Temp. A.M. 39·2°C. No hæmatozoa in the blood. Temp. P.M. 40·1°C.

25th.—Temp. A.M. 40·8°C. No hæmatozoa in the blood. Temp. P.M. 41·8°C.

26th.—Temp. A.M. 40·3°C. No hæmatozoa in the blood. Temp. P.M. 40·7°C.

27th.—Temp. A.M. 40·6°C. No hæmatozoa in the blood. Temp. P.M. 41·4°C.

28th.—Temp. A.M. 40·5°C. No hæmatozoa in the blood. Temp. P.M. 40·8°C.

29th.—Temp. A.M. 40·2°C. No hæmatozoa in the blood. Temp. P.M. 41·3°C.

30th.—Temp. A.M. 40·9°C. No hæmatozoa in the blood. Temp. P.M. 41·5°C.

1st December.—Temp. A.M. 39·7°C. No hæmatozoa in the blood. Temp. P.M. 41·°C.

2nd.—Temp. A.M. 40·7°C. No hæmatozoa in the blood. Temp. P.M. 41·3°C.

3rd.—Temp. A.M. 40·8°C. No hæmatozoa in the blood. Temp. P.M. 41·0°C.

4th.—Temp. A.M. 40·7°C. No hæmatozoa in the blood. Temp. P.M. 41·6°C.

5th.—Temp. A.M. 40·5°C. Hæmatozoa absent from the blood. Temp. P.M. 41·3°C.

6th.—Temp. A.M. 41·4°C. Hæmatozoa absent from the blood. Temp. P.M. 41·5°C.

7th.—Temp. A.M. 41·4°C. Hæmatozoa absent from the blood. Temp. P.M. 41·7°C.

8th.—Temp. A.M. 40·2°C. Hæmatozoa absent from the blood. Temp. P.M. 41·4°C.

9th.—Temp. A.M. 41·2°C. Hæmatozoa absent from the blood. Temp. P.M. 40·8°C.

10th.—Temp. A.M. 41·0°C. Hæmatozoa absent from the blood. Temp. P.M. 41·3°C.

11th.—Temp. A.M. 41·2°C. Hæmatozoa absent from the blood. Temp. P.M. 41·3°C.

12th.—The animal appears very dull this morning, and is suffering from pain in the head. A spasm of the muscles of deglutition occurs on trying to drink. There is some fluid present in the right tunica vaginalis, but hæmatozoa are absent from it. Temp. A.M. 41·5°C. Hæmatozoa absent from the blood. Temp. P.M. 41·4°C.

13th.—Temp. A.M. 41·4°C. No hæmatozoa in the blood. Temp. P.M. 41·4°C.

14th.—Temp. A.M. 40·6°C. No hæmatozoa in the blood. Temp. P.M. 40·9°C.

15th.—Temp. A.M. 40·4°C. No hæmatozoa in the blood. Temp. P.M. 41·4°C.

16th.—Temp. A.M. 40·1°C. No hæmatozoa in the blood. Temp. P.M. 41·1°C.

17th.—Temp. A.M. 40·4°C. No hæmatozoa in the blood. Temp. P.M. 40·3°C.

The animal appears to be very dull and torpid this morning; he now prefers the recumbent position. Previously he appeared to be always standing. Clear saliva dribbles from its mouth.

18*th.*—Temp. A.M. 39·9°C. No hæmatozoa in the blood. Temp. P.M. 40·2°C.

19*th.*—Temp. A.M. 40·2°C. No hæmatozoa in the blood. Temp. P.M. 40·6°C.

20*th.*—Temp. A.M. 39·8°C. No hæmatozoa in the blood. Temp. P.M. 40·3°C.

21*st.*—Temp. A.M. 39·7°C. No hæmatozoa in the blood. Temp. P.M. 40·7°C.

22*nd.*—Temp. A.M. 38·9°C. No hæmatozoa in the blood. Temp. P.M. 40·7°C.

23*rd.*—Temp. A.M. 40·5°C. No hæmatozoa in the blood. Temp. P.M. 40·7°C.

24*th.*—Temp. A.M. 40·3°C. No hæmatozoa in the blood. Temp. P.M. 40·5°C·

25*th.*—Temp. A.M. 39·6°C. No hæmatozoa in the blood. Temp. P.M. 41·3°C.

26*th.*—Temp. A.M. 39·6°C. No hæmatozoa in the blood, but they were found to be numerous in the fluid drawn from tunica vaginalis testis by means of a small Pravaz syringe. Temp. P.M. 39·7°C.

27*th.*—Temp. A.M. 40·3°C. No hæmatozoa in the blood. Temp. P.M. 39·7°C·

28*th.*—Temp. A.M. 39·3°C. No hæmatozoa in the blood. Temp. P.M. 41·1°C.

29*th.*—Temp. A.M. 40·7°C. No hæmatozoa in the blood although present in the fluid from the tunica vaginalis. The power of resistance shown by this animal is wonderful. He is reduced to a skeleton. At times he seems to be unconscious and has more than once appeared to be almost in a dying condition, but on the following day has recovered sufficiently to take his food and has again improved. Temp. P.M. 40·3°C.

30*th.*—Temp. A.M. 40·5°C. Hæmatozoa absent from the blood. Temp. P.M. 40·1°C.

31*st.*—Temp. A.M. 40·4°C. Hæmatozoa absent from the blood. Temp. P.M. 40·4°C.

1*st January* 1891.—The animal died at 1 A.M.

AUTOPSY at 9-30 A.M. Body very much emaciated.

Thorax.—No fluid in the pleural cavities. But both lungs present some yellow-coloured exudation at the apices, and also on their superior surfaces. The different lobes are more or less agglutinated by lymph.

Right Lung.—There are numerous patches of atelectasis at the apex and some isolated lobules scattered over its surface, with intervening lobules the seat of emphysema. The right base is of a deep-red colour and somewhat firm to the touch. *On section,* the cut surface presents the same colour and appearance.

Left Lung.—The apex and the upper half of the organ are more or less in a state of atelectasis; the remaining portion presents an early condition of emphysema.

Heart.—The *pericardium* contains about one drachm of a viscid, straw-coloured fluid. The organ is distended and both auricles and ventricles are filled with large, firm blood-clots; there are no sub-endocardial extravasations in any of the cavities.

Liver.—The convex surface is covered by a thin layer of lymph. The organ presents a dark-reddish colour on section, and is soft in consistency. The lobules are not clearly defined, but all the ducts are stained a yellow colour.

Stomach.—This organ appears quite normal.

Spleen.—Somewhat enlarged; the convex surface is covered with lymph. *On section,* the tissue of the organ is soft and somewhat dark in colour.

Kidneys.—The capsules strip easily. There are numerous yellow-coloured, round bodies varying considerably in size, which are lying just under a thin layer of the cortical portion of the organ. *On section,* these are found to be circumscribed and to be lying in the kidney substance at from ⅛th to ⅜th of an inch from the surface of the organ. One is easily able to enucleate them, when they appear spherical in form, hard in texture, and of a pale yellow colour.

The great omentum is dotted over from the curvature of the stomach to the inguinal region, more especially on the left side with irregular groups of petechiæ. On drawing up the omentum, some ten ounces of fluid were found in the peritoneal cavity. Attached to the omentum in the left lumbar region is an hydatid cyst, the size of a walnut.

Testicles.—About one drachm of an albuminous fluid was drawn off from the right tunica vaginalis, but no hæmatozoa were found in it. On dissection the apposite walls of the tunica vaginalis were found to be adherent to one another. The left testicle, *on section,* presents a localized patch, circular in form and red in colour, the seat of some inflammatory change.

Brain.—The skull was divided by first making an incision through the skin and then sawing through the bony structures so as to divide it in two equal parts; a considerable amount of cerebral fluid, slightly milky in colour, escaped from the cavity of the lateral ventricles. The hemispheres were only represented by a thin layer of brain substance, not as thick as the parietal bone, and the lateral ventricles formed one large cavity.

The chief points of interest in this case are :—

(i). That the disease can be transmitted from the horse to the goat by inoculation of blood subcutaneously.

(ii). That the period of incubation in this case was six days.

(iii). That on the sixth day after inoculation, although the blood of the general circulation was examined carefully, no hæmatozoon was found; whilst hæmatozoa were discovered in the serous fluid taken from the seat of inoculation.

(iv). That although, the tenth day of the disease was the last upon which hæmatozoa were found in the blood, still as late as the 47th day they were discovered in the fluid drawn off from the tunica vaginalis testis.

GOAT No. II.

On May 9th, 1891, administered by mouth 1c.c. of blood containing numerous hæmatozoa mixed with tap-water; the blood was taken from Horse No. XXI.

10*th*.—The same quantity was administered by the mouth, in which the hæmatozoa were very numerous.

11*th*.—Hæmatozoa absent from the blood.

12*th*.—Hæmatozoa absent from the blood.

13*th*.—Hæmatozoa absent from the blood.

14*th*.—Hæmatozoa absent from the blood.

15*th*.—	Temp.	A.M.	——	P.M.	38·8°C.	Hæmatozoa absent	from the blood.
16*th*	,,	,,	38·7°C.	,,	38·9°C.	,,	,,
17*th*	,,	,,	38·5°C.	,,	39·8°C.	,,	,,
18*th*	,,	,,	39·5°C.	,,	39·7°C.	,,	,,
19*th*	,,	,,	39·4°C.	,,	39·6°C.	,,	,,
20*th*	,,	,,	39·4°C.	,,	39·8°C.	,,	,,
21*st*	,,	,,	39·5°C.	,,	39·4°C.	,,	,,
22*nd*	,,	,,	39·6°C.	,,	39·9°C.	,,	,,
23*rd*	,,	,,	39°C.	,,	39·2°C.	,,	,,
24*th*	,,	,,	38·7°C.	,,	39·3°C.	,,	,,
25*th*	,,	,,	39·1°C.	,,	38·6°C.	,,	,,
26*th*	,,	,,	38·2°C.	,,	38·7°C.	,,	,,
27*th*	,,	,,	38·5°C.	,,	39·1°C.	,,	,,
28*th*	,,	,,	38·7°C.	,,	39·3°C.	,,	,,
29*th*	,,	,,	38·8°C.	,,	39·7°C.	,,	,,
30*th*	,,	,,	38·2°C.	,,	38·6°C.	,,	,,
31*st*	,,	,,	38·3°C.	,,	38·7°C.	,,	,,
1*st June*	,,	,,	38·4°C.	,,	38·6°C.	,,	,,
2*nd*	,,	,,	38·4°C.	,,	38·7°C.	,,	,,
3*rd*	,,	,,	38·5°C.	,,	38·7°C.	,,	,,
4*th*	,,	,,	38·4°C.	,,	38·6°C.	,,	,,
5*th*	,,	,,	38·5°C.	,,	38·7°C.	,,	,,
6*th*	,,	,,	38·6°C.	,,	38·7°C.	,,	,,
7*th*	,,	,,	38·5°C.	,,	38·9°C.	,,	,,
8*th*	,,	,,	38·7°C.	,,	38·9°C.	,,	,,
9*th*	,,	,,	38·2°C.	,,	38·8°C.	,,	,,
10*th*	,,	,,	38·6°C.	,,	38·6°C.	,,	,,
11*th*	,,	,,	38·7°C.	,,	38·8°C.	,,	,,
12*th*	,,	,,	38·6°C.	,,	33·4°C.	,,	,,
13*th*	,,	,,	38·1°C.	,,	38·7°C.	,,	,,
14*th*	,,	,,	38·4°C.	,,	38·6°C.	,,	,,
15*th*	,,	,,	38·9°C.	,,	39·2°C.	,,	,,

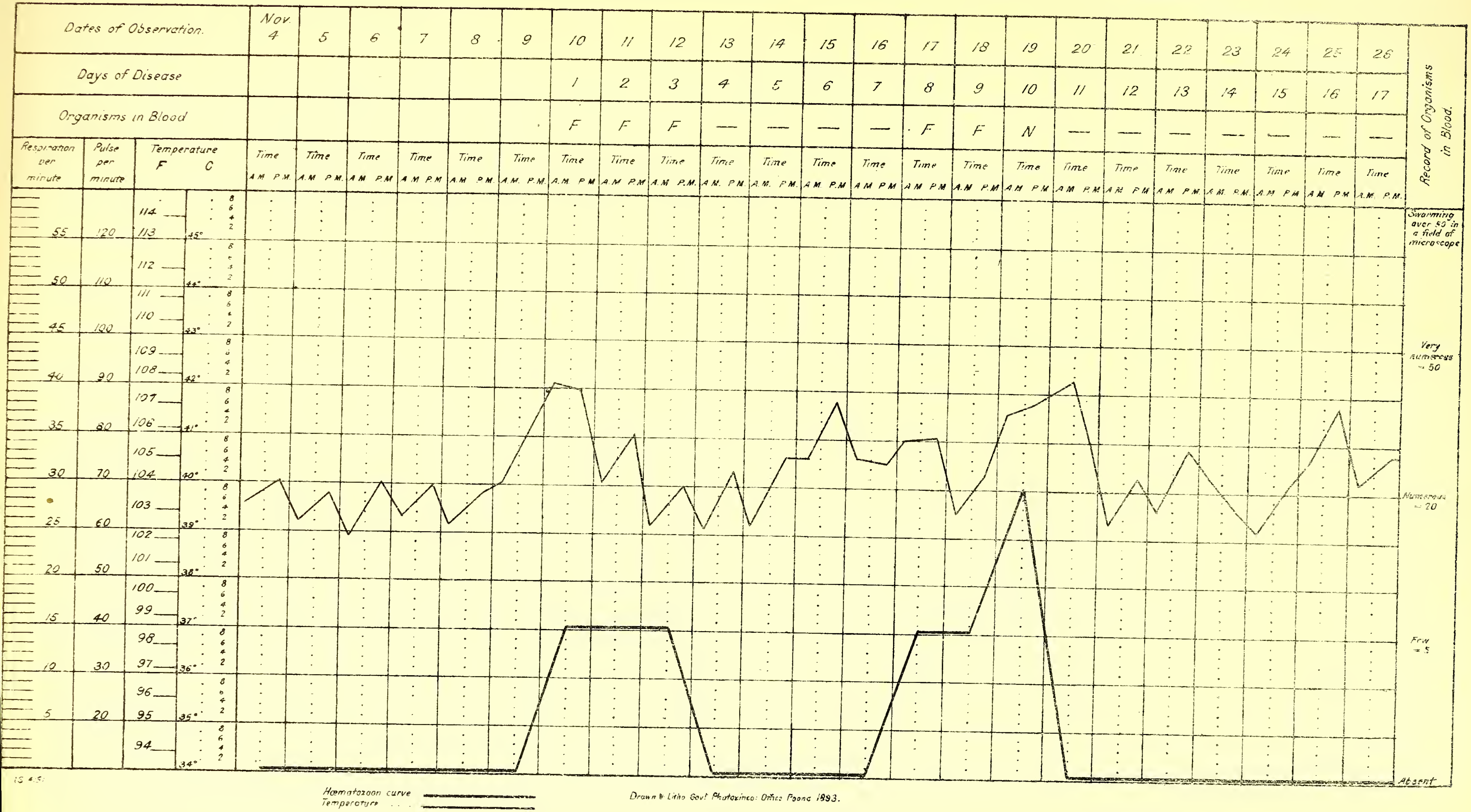
Administered 1·3 c.c. of blood in water by the mouth; the blood taken from the Surra horse is swarming with hæmatozoa.

16*th*.—	Temp.	A.M.	38·8°C.	P.M.	39·5°C.	Hæmatozoa absent	from the blood.
17*th*	,,	,,	39·2°C.	,,	39·3°C.	,,	,,
18*th*	,,	,,	38·9°C.	,,	39·4°C.	,,	,,
19*th*	,,	,,	39·2°C.	,,	39·2°C.	,,	,,
20*th*	,,	,,	39·1°C.	,,	40·1°C.	,,	,,

RECORDS OF TEMPERATURE

inoculated with blood from Horse No. II. ______ Age ______ Sex Male ______ Colour Brown & White

Disease "Surra" ______ Date of Inoc: Nov: 4th 90. 9 a m ___ Result Death ______ Date of Result Jany 1.91 ___ Register No. I. ______

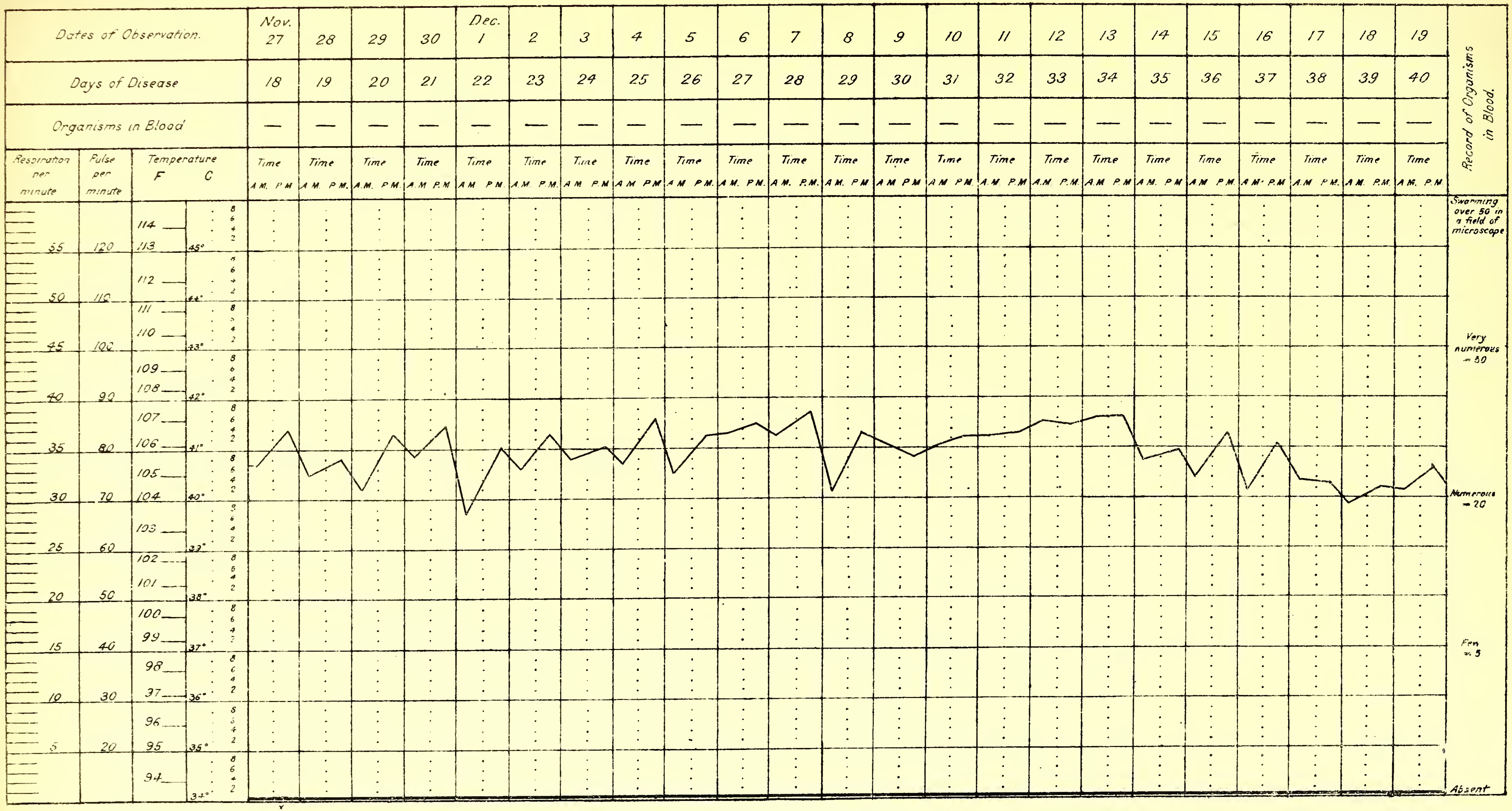


Dates of Observation.	Nov. 4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Days of Disease							1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Organisms in Blood							F	F	F	—	—	—	—	F	F	N	—	—	—	—	—	—	—

Drawn & Litho Govt Photozinco: Office Poona 1893.

Age ________ Sex ________ Colour ________

Disease ________ Date of ________ Result ________ Date of Result ________ Register No. ________



(S 415)

Hæmatozoon curve
Temperature ....

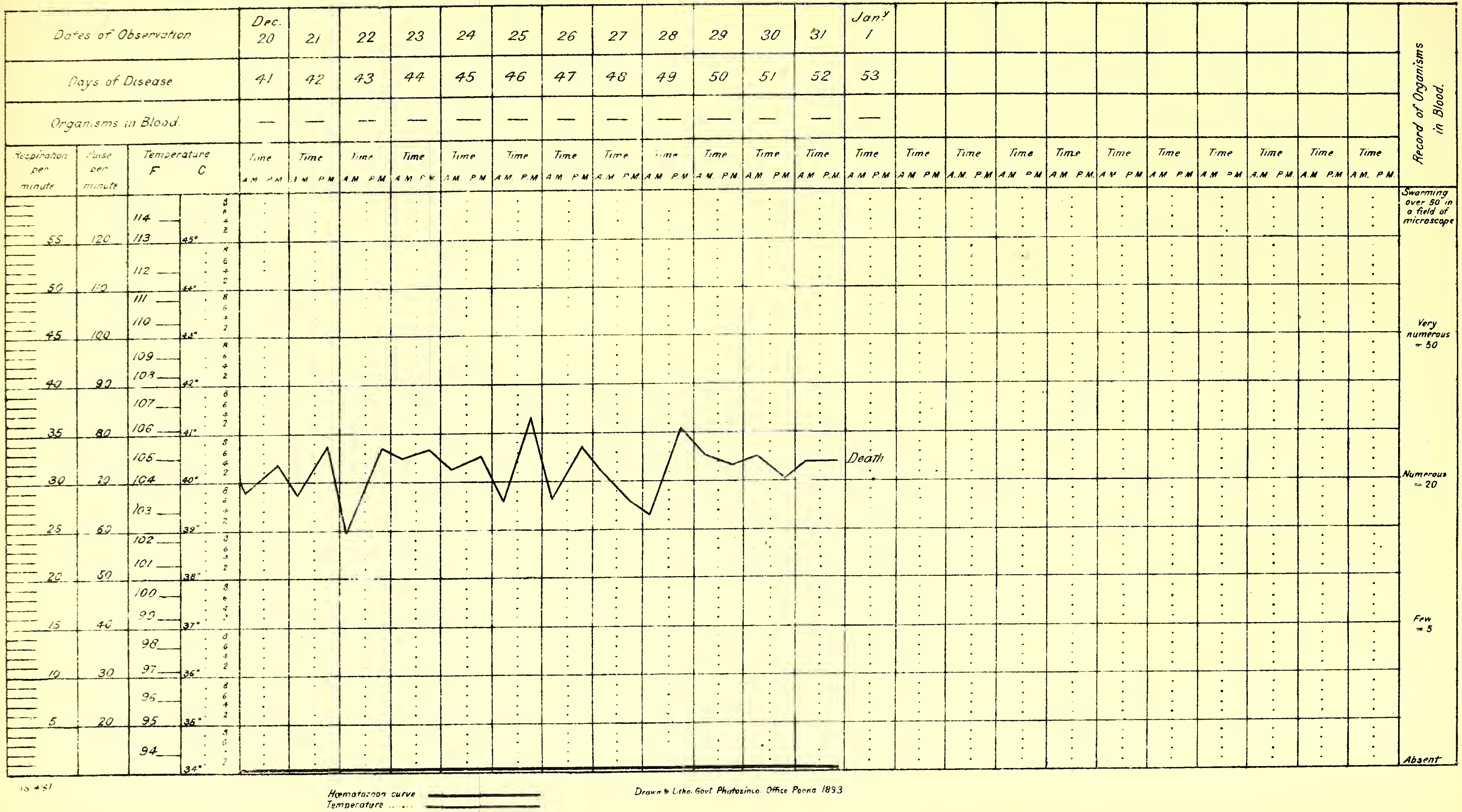
Drawn & Litho: Govt. Photozinco: Office Poona 1893.

x Hæmatozoa in the fluid of tunica vaginalis testis.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age ______ Sex ______ Colour ______

Disease ______ Date of ______ Result ______ Date of Result ______ Register No. ______



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Drawn & Litho. Govt Photozinco. Office Poona 1893

21*st June*.—	Temp. A.M.	39·5°C.	P.M.	38·2°C.	Hæmatozoa absent	from the blood.
22*nd* „	„	38·3°C.	„	39·5°C.	„	„
23*rd* „	„	38·6°C.	„	38·4°C.	„	„

Many refractile bodies observed microscopically in the blood serum.

24*th* „	„	38·3°C.,	P.M.	39·6°C.	Hæmatozoa absent	from the blood.
25*th* „	„	38·2°C.	„	39·3°C.	„	„
26*th* „	„	38·3°C.	„	39·8°C.	„	„
27*th* „	„	38·3°C.	„	40°C.	„	„
28*th* „	„	38·4°C.	„	40·1°C.	„	„
29*th* „	„	38·5°C.	„	40·2°C.	„	„
30*th* „	„	39·1°C.	„	39·5°C.	„	„
1*st July*.	„	38·2°C.	„	38·5°C.	„	„
2*nd* „	„	38·5°C.	„	39·4°C.	„	„
3*rd* „	„	38·4°C.	„	40°C.	„	„
4*th* „	„	38·3°C.	„	40·4°C.	„	„
5*th* „	„	39·2°C.	„	38·5°C.	„	„
6*th* „	„	38·4°C.	„	39·6°C.	„	„
7*th* „	„	38·2°C.	„	39·2°C.	„	„
8*th* „	„	38·3°C.	„	38·8°C.	„	„
9*th* „	„	38·6°C.	„	39°C.	„	„
10*th* „	„	38·4°C.	„	39·5°C.	„	„
11*th* „	„	38°C.	„	39·3°C.	„	„
12*th* „	„	38·8°C.	„	39·2°C.	„	„
13*th* „	„	38·7°C.	„	39·8°C.	„	„
14*th* „	„	39·3°C.	„	38·7°C.	„	„
15*th* „	„	37·8°C.	„	39°C.	„	„
16*th* „	„	38·5°C.	„	39·1°C.	„	„
17*th* „	„	38·4°C.	„	39·1°C.	„	„
18*th* „	„	38·6°C.	„	39·1°C.	„	„
19*th* „	„	38·7°C.	„	39°C.	„	„
20*th* „	„	38·3°C.	„	39·1°C.	„	„
21*st* „	„	38·5°C.	„	39·4°C.	„	„
22*nd* „	„	38·7°C.	„	39·1°C.	„	„
23*rd* „	„	38·2°C.	„	39°C.	„	„
24*th* „	„	38·6°C.	„	39°C.	„	„
25*th* „	„	38·2°C.	„	38·6°C.	„	„
26*th* „	„	38·1°C.	„	39°C.	„	„
27*th* „	„	37·7°C.	„	38·7°C.	„	„
28*th* „	„	37·5°C.	„	38·8°C.	„	„
29*th* „	„	37·5°C.	„	38·5°C.	„	„
30*th* „	„	38·3°C.	„	38·6°C.	„	„
31*st* „	„	38°C.	„	38·5°C.	„	„
1*st Aug*.	„	38·1°C.	„	38·6°C.	„	„
2*nd* „	„	38·4°C.	„	39·2°C.	„	„
3*rd* „	„	38·7°C.	„	39·3°C.	„	„
4*th* „	„	39°C.	„	39·3°C.	„	„
5*th* „	„	38·8°C.	„	39·3°C.	„	„
6*th* „	„	39·1°C.	„	39·2°C.	„	„
7*th* „	„	38·8°C.	„	39°C.	„	„
8*th* „	„	38·3°C.	„	38·8°C.	„	„
9*th* „	„	38·5°C.	„	38·7°C.	„	„
10*th* „	„	38·1°C.	„	38·8°C.	„	„
11*th* „	„	38·5°C.	„	39°C.	„	„
12*th* „	„	37·8°C.	„	38·7°C.	„	„
13*th* „	„	38°C.	„	38·8°C.	„	„
14*th* „	„	38·3°C.	„	39·4°C.	„	„

15*th. Aug.*	—Temp.	A.M. 38·6°C.,	P.M. 38·8°C.	Hæmatozoa absent	from the blood.
16*th* ,,	,,	38·7°C.	,, 38·7°C.	,,	,,
17*th* ,,	,,	38·3°C.	,, 39·1°C.	,,	,,
18*th* ,,	,,	38·5°C.	,, 39·2°C.	,,	,,
19*th* ,,	,,	39°C.	,, 38·5°C.	,,	,,

The animal is very dull and the appetite is poor. This morning at 7 A.M. a white frothy fluid was observed coming from the mouth and covering the lips.

20*th* ,,	,,	38·7°C.,	P.M. 39·1°C.	Hæmatozoa absent	from the blood.
21*st* ,,	,,	38·7°C.	,, 37·5°C.	,,	,,
22*nd* ,,	,,	38·7°C.	,, 38·6°C.	,,	,,
23*rd* ,,	,,	38·2°C.	,, 39°C.	,,	,,
24*th* ,,	,,	38·3°C.	,, 38·7°C.	,,	,,
25*th* ,,	,,	38·2°C.	,, 38·8°C.	,,	,,
26*th* ,,	,,	38·4°C.	,, 39°C.	,,	,,
27*th* ,,	,,	38·7°C.	,, 39·7°C.	,,	,,
28*th* ,,	,,	38·6°C.	,, 38·5°C.	,,	,,
29*th* ,,	,,	38·1°C.	,, 38·8°C.	,,	,,
30*th* ,,	,,	38·6°C.	,, 39·1°C.	,,	,,
31*st* ,,	,,	38·6°C.	,, 39°C.	,,	,,
1*st Sept.*	,,	38·3°C.	,, 38·7°C.	,,	,,
2*nd* ,,	,,	38·4°C.	,, 38·7°C.	,,	,,
3*rd* ,,	,,	38·2°C.	,, 38·7°C.	,,	,,
4*th* ,,	,,	38·4°C.	,, 38·4°C.	,,	,,
5*th* ,,	,,	37·7°C.	,, 38·5°C.	,,	,,
6*th* ,,	,,	38°C.	,, 38·5°C.	,,	,,
7*th* ,,	,,	38·1°C.	,, 38·1°C.	,,	,,
8*th* ,,	,,	38·5°C.	,, 39°C.	,,	,,
9*th* ,,	,,	38·7°C.	,, 39°C.	,,	,,
10*th* ,,	,,	38·6°C.	,, 38·8°C.	,,	,,
11*th* ,,	,,	38·4°C.	,, 39°C.	,,	,,
12*th* ,,	,,	38·3°C.	,, 39·1°C.	,,	,,
13*th* ,,	,,	39·3°C.	,, 38·7°C.	,,	,,
14*th* ,,	,,	38·3°C.	,, 39·5°C.	,,	,,
15*th* ,,	,,	38·1°C.	,, 39·4°C.	,,	,,
16*th* ,,	,,	38·3°C.	,, 38·6°C.	,,	,,
17*th* ,,	,,	38·2°C.	,, 38·5°C.	,,	,,
18*th* ,,	,,	38·1°C.	,, 39°C.	,,	,,
19*th* ,,	,,	38·2°C.	,, 39·1°C.	,,	,,
20*th* ,,	,,	38·7°C.	,, 39·2°C.	,,	,,
21*st* ,,	,,	38·6°C.	,, 39°C.	,,	,,
22*nd* ,,	,,	39·1°C.	,, 38·8°C.	,,	,,
23*rd* ,,	,,	38·1°C.	,, 39°C.	,,	,,
24*th* ,,	,,	38·2°C.	,, 39·3°C.	,,	,,
25*th* ,,	,,	38·5°C.	,, 39·1°C.	,,	,,
26*th* ,,	,,	39·1°C.	,, 39·2°C.	,,	,,
27*th* ,,	,,	38·3°C.	,, 38·7°C.	,,	,,
28*th* ,,	,,	38·1°C.	,, 38·7°C.	,,	,,
29*th* ,,	,,	38·6°C.	,, 39·1°C.	,,	,,
30*th* ,,	,,	38·3°C.	,, 38·7°C.	,,	,,
1*st Oct.*	,,	37·8°C.	,, 38·8°C.	,,	,,
2*nd* ,,	,,	37·8°C.	,, 39·4°C.	,,	,,
3*rd* ,,	,,	39°C.	,, 39·1°C.	,,	,,
4*th* ,,	,,	38·7°C.	,, 39°C.	,,	,,
5*th* ,,	,,	38·5°C.	,, 38·8°C.	,,	,,
6*th* ,,	,,	38·2°C.	,, 39·4°C.	,,	,,
7*th* ,,	,,	38·6°C.	,, 39·2°C.	,,	,,

8th. Oct.—Temp.	A.M.	38·7°C.	P. M.	39·3°C.	Hæmatozoa absent from the blood.
9th ,,	,,	38·8°C.	,,	39·2°C.	,, ,,
10th ,,	,,	38·8°C.	,,	39·1°C.	,, ,,
11th ,,	,,	38·6°C.	,,	39·1°C.	,, ,,
12th ,,	,,	38·7°C.	,,	39·3°C.	,, ,,
13th ,,	,,	38·2°C.	,,	39·1°C.	,, ,,
14th ,,	,,	39°C.	,,	39·1°C.	,, ,,
15th ,,	,,	39·5°C.	,,	39·7°C.	,, ,,
16th ,,	,,	39·1°C.	,,	39·2°C.	,, ,,
17th ,,	,,	39·8°C.	,,	39·4°C.	,, ,,
18th ,,	,,	38·6°C.	,,	38·8°C.	,, ,,

For several days the animal has been making a noise resembling the cry of hydrocephalic child, and stands with its head against the wall for support or even places it on a chair or box, or wherever it can obtain support for it.

19th.—Temp.	A. M.	38·7°C.,	P. M.	38.6°C.	Hæmatozoa absent from the blood.
20th	,, ,,	38·8°C.	,,	38·8°C.	,, ,,
21st	,, ,,	39·3°C.	,,	39·1°C.	Hæmatozoa absent from the blood.
22nd	,, ,,	39·1°C.	,,	39·3°C.	,, ,,
23rd	,, ,,	39°C.	,,	39·7°C.	,, ,,
24th	,, ,,	39·2°C.	,,	39·5°C.	,, ,,

At 12 noon, the animal vomited semi-digested food; at 5 P.M., uttered a shriek and fell down, apparently dead, with limbs extended; in two or three minutes it recovered and sat up.

25th.—This morning the animal appears all right with this exception that the head hangs down, as if too heavy, and it finds it difficult to support. Temp. A M. 38·8°C. Hæmatozoa absent from the blood. Temp. P.M. 39·5°C.

26th.—Temp.	A.M.	39·1°C.,	P.M.	39·6°C.	Hæmatozoa absent from the blood.
27th	,, ,,	39·1°C.	,,	39·7°C.	,, ,, ,,

28th.—At, 10 A.M. the animal again fell with a cry and became unconscious for 10 minutes. At 11 A.M. it is sitting up, but in a semi-dazed condition. The pupils are equal. Temp. A.M. 38·7°C. Hæmatozoa absent from the blood. Temp. P.M. 39·6°C.

29th.—Temp.	A.M.	38·2°C.,	P.M.	39·2°C.	Hæmatozoa absent from the blood.
30th	,, ,,	38·6°C.	,,	39·5°C.	,, ,, ,, ,,
31st	,, ,,	38·7°C.	,,	39·3°C.	,, ,, ,, ,,
1st November.—Temp.	A.M.	39·1°C.,	P.M.	39·3°C.	Hæmatozoa absent from the blood.
2nd ,,	,, ,,	38·6°C.	,,	39·6°C.	,, ,, ,, ,,
3rd ,,	,, ,,	39·4°C.	,,	39·6°C.	,, ,, ,, ,,
4th ,,	,, ,,	38·5°C.	,,	39·5°C.	,, ,, ,, ,,

5th.—The animal has had several convulsive attacks during the day; the first at 7-15 A.M., the second at noon and the last at 4 P.M. It first walked round for some seconds, each time reducing the diameter of the circle, and giving utterance all the time to a cry exactly resembling a child, the subject of hydrocephalis. Then making the right fore-leg the pivot, the feet of the animal became so mixed, that it fell to the ground, with convulsive movements of the body, grinding of the teeth and the escape of frothy saliva from the lips, which were firmly closed. Temp. A.M. 38·8°C. Hæmatozoa absent from the blood. Temp. P.M. 39·7°C.

6th.—Temp. A.M. 39·°C., P.M. 39·6°C. Hæmatozoa absent from the blood. Fits at 1-15 P.M. and 2 P.M.

7th—Temp. A.M. 38·8°C, P.M. 39·4°C. Hæmatozoa absent from the blood.

8th.—At 6 A.M. uttered the peculiar cry, at 8-30 A.M. commenced to walk round in a circle and then stood on all fours, resting its head against the wall. Temp. A.M. 38·5°C. Hæmatozoa absent from the blood. Temp. P.M. 39·6°C.

9th.—At 6 A.M. the animal became unconscious after a seizure as described above; the legs are extended and somewhat rigid, but the rigidity is easily overcome. Temp. A.M. 40·2°C. Hæmatozoa absent from the blood. Temp. P.M. 40·6°C.

10th.—The animal continues unconscious, the legs are becoming more rigid. Temp. A.M. 39·2°C. Hæmatozoa absent from the blood. Temp. P.M. 40·2°C.

11th.—Temp. A.M. 40·2°C. The animal is unconscious, all four legs are very rigid. Death at 10-35 A.M.

AUTOPSY.—The thoracic and abdominal organs appear healthy, but there are several cysts containing fluid, adherent to the great omentum, varying in size, one having attained the proportions of a Tangerene orange.

Brain.—The cranial cavity was opened by making a vertical incision through the median line of the skull so as to saw through the bony envelope with as little injury as possible to the nervous structures beneath. On forcing the two halves of the skull apart, it was found that the incision had been carried into the surface of the cerebrum ; consequently the external surface of a large cyst, distended with fluid, came into view, which on its removal was found to have occupied a cavity formed by the union of the lateral ventricles into one. The lateral ventricles have been so distended and the substance of the hemispheres so compressed and atrophied by this cystic tumor, that the superior and lateral covering of brain-tissue only now averages from $\frac{1}{5}$th to $\frac{1}{4}$th of an inch in thickness. The dura-mater is firmly attached to the inner surface of the cranium, and the outer surface of this thin layer of nervous tissue is firmly adherent to the inner surface of the dura-mater.

On section, the wall of this cyst is found to be a thin and translucent membrane, its cavity being filled with colourless watery fluid. On the inner surface of this membrane there are several groups of white spots, lying at some distance apart, projecting into the interior of the cavity, the individual spots being very small in size.

On microscopical examination of one of these spots, it revealed a head armed with 32 hooks, a neck, and body, and was recognized as possessing all the characteristics of a scolex of the Tænia cœnurus (Küch), and so the diagnosis of the disease became easy ; Hydatido-cephalus or " Gid," due to the presence of the " Cœnurus cerebralis."

The points of interest in this case are, that :—

(i). Although on two successive days, one cubic centimetre of blood, containing numerous hæmatozoa, was given by the mouth, followed by a third dose of 1·3 c. c. somewhat later, no symptoms ascribable to Surra presented themselves.

(ii). The cerebral symptoms observed five months later which were thought to be probably due to fluid in the lateral ventricles, the effect of the hæmatozoon, proved on *post-mortem* examination to be caused by the presence of the " Cœnurus cerebralis."

GOAT No. III.

A strong and healthy animal, in good condition, two years of age.

15th *May* 1891.—Temp.	A.M.———	P.M. 40·3°C.	Blood healthy.
16th „	„ 40·°C.	P.M. 40·4°C.	„
17th „	„ 40·1°C.	P.M. 40°C.	„
18th „	„ 39·8°C.	P.M. 39·9°C.	„
19th „	„ 39·6°C.	P.M. 39·5°C.	„
20th „	„ 39·3°C.	P.M. 39·5°C.	„
21st „	„ 39·2°C.	P.M. 39·9°C.	„
22nd „	„ 40°C.	P.M. 40·1°C.	„
23rd „	„ 39·8°C.	P.M. 39·6°C.	„
24th „	„ 39·2°C.	P.M. 39·8°C.	„
25th „	„ 39·5°C.	P.M. 39·6°C.	„
26th „	„ 39·2°C	P.M. 39·5°C.	„
27th „	„ 39·3°C.	P.M. 39·8°C.	„
28th „	„ 39·5°C.	P.M. 39·8°C.	„
29th „	„ 39·4°C.	P.M. 39·5°C.	„
30th „	„ 39·3°C.	P.M. 39·6°C.	„
31st „	„ 39·2°C.	P.M. 39·5°C.	„
1st *June.*—	„ 39·2°C.	P.M. 39·5°C.	„
2nd „	„ 39·2°C.	P.M. 39·6°C.	„
3rd „	„ 39·4°C.	P.M. 39·7°C.	„

4th.—11 A.M. Inoculated subcutaneously in the Right Inguinal Region, with 1 c. c. of blood taken from the heart of Horse No. XXI, $5\frac{1}{4}$ hours after death. Hæmatozoa swarming previous to death.

Temp A.M. 39·4°C. P.M. 39·1°C. Blood healthy.

5th —Temp.	A.M. 37·8°C.	P.M. 39·2°C.	Hæmatozoa absent	from the blood.
6th „	„ 39·9°C.	„ 39·2°C.	„	„
7th „	„ 38·8°C.	„ 39·3°C.	„	„
8th „	„ 39·°C.	„ 39·5°C.	„	„

9th June.—	Temp.	A.M. 38·7°C.	P.M.	38·9°C.	Hæmatozoa	absent from the blood.
10th ,,	,,	38·9°C.	,,	39·5°C.	,,	few in the blood.
11th ,,	,,	39·4°C.	,,	39·4°C.	,,	,,
12th ,,	,,	39·2°C.	,,	39·5°C.	,,	absent from the blood.
13th ,,	,,	39·2°C.	,,	39·8°C.	,,	,,
14th ,,	,,	39·5°C.	,,	39·8°C.	,,	,,
15th ,,	,,	39·6°C.	,,	39·9°C.	,,	,,
16th ,,	,,	39·5°C.	,,	39·8°C.	,,	,,
17th ,,	,,	39·6°C.	,,	39·8°C.	,,	few in the blood.
18th ,,	,,	41·4°C.	,,	40·8°C.	,,	numerous in the blood.
19th ,,	,,	40·6°C.	,,	40·6°C.	,,	absent from the blood.
20th ,,	,,	40·3°C.	,,	41·3°C.	,,	few in the blood.
21st ,,	,,	40·6°C.	,,	38·5°C.	,,	absent from the blood.
22nd ,,	,,	38·6°C.	,,	39·6°C.	,,	few in the blood.
23rd ,,	,,	39·8°C.	,,	40°C.	,,	,,
24th ,,	,,	40·7°C.	,,	39·7°C.	,,	numerous in the blood.
25th ,,	,,	40·4°C.	,,	40·3°C.	,,	absent from the blood.
26th ,,	,,	40·2°C.	,,	40°C.	,,	,,
27th ,,	,,	39·6°C.	,,	40·6°C.	,,	,,
28th ,,	,,	39·6°C.	,,	40·5°C.	,,	,,
29th ,,	,,	39·8°C.	,,	40·4°C.	,,	,,
30th ,,	,,	40·5°C.	,,	40°C.	,,	,,
1st July.—	,,	40·3°C.	,,	40·4°C.	,,	,,
2nd ,,	,,	40·8°C.	,,	40·3°C.	,,	,,
3rd ,,	,,	40·2°C.	,,	40·6°C.	,,	,,
4th ,,	,,	40·2°C.	,,	40·8°C.	,,	,,
5th ,,	,,	39·8°C.	,,	39·6°C.	,,	,,
6th ,,	,,	39·5°C.	,,	39·4°C.	,,	,,
7th ,,	,,	39·7°C.	,,	39·8°C.	,,	,,
8th ,,	,,	40·2°C.	,,	40·3°C.	,,	,,
9th ,,	,,	40·1°C.	,,	40·1°C.	,,	,,
10th ,,	,,	40·2°C.	,,	40·3°C.	,,	,,
11th ,,	,,	39·1°C.	,,	40·5°C	,,	,,
12th ,,	,,	41·1°C.	,,	40·3°C.	,,	,,
13th ,,	,,	39°C.	,,	40·4°C.	,,	,,
14th ,,	,,	40·3°C.	,,	40·8°C.	,,	,,
15th ,,	,,	40·5°C.	,,	40·7°C.	,,	,,
16th ,,	,,	40·1°C.	,,	40·7°C.	,,	,,
17th ,,	,,	40·2°C.	,,	40·6°C.	,,	,,
18th ,,	,,	41°C.	,,	40·7°C.	,,	,,
19th ,,	,,	40·8°C.	,,	40·7°C.	,,	,,
20th ,,	,,	41·3°C.	,,	41·2°C.	,,	,,

The scrotum is considerably increased in size and tender on the slightest pressure. Fluid in the Tunicæ vaginales. Hæmatozoa numerous in this fluid.

21st ,,	,,	41·2°C.	P.M.	41·7°C.	Hæmatozoa absent from the blood.
22nd ,,	,,	41°C.	,,	41·3°C.	,, ,,
23rd ,,	,,	41·2°C.	,,	41·5°C.	Hæmatozoa absent from the blood. Numerous in the tunica vaginalis fluid.
24th ,,	,,	41·3°C.	,,	41·2°C.	,, ,,
25th ,,	,,	40·1°C.	,,	40·8°C.	,, ,,
26th ,,	,,	40·6°C.	,,	41·4°C.	,, ,,
27th ,,	,,	41°C.	,,	41·3°C.	,, ,,
28th ,,	,,	40·4°C.	,,	41·2°C.	,, ,,
29th ,,	,,	41°C.	,,	41·1°C.	,, ,,
30th ,,	,,	40·5°C.	,,	41°C.	,, ,,
31st ,,	,,	40·7°C.	,,	41·4°C.	,, ,,

1st August.—Temp. A.M. 41·3°C. P.M. 41·2°C. } Hæmatozoa absent from the blood. Numerous in the tunica vaginalis fluid.

There is considerable swelling and œdema behind the lower jaw on the right side and also in the subcutaneous tissue of the skin between the angle of the jaw and the symphysis on the same side.

2nd ,, Temp. A.M. 40·7°C. P.M. 40·8°C. { Hæmatozoa absent from the blood. Numerous in the tunica vaginalis fluid.

3rd ,, ,, 40·7°C. ,, 41·3°C. ,, ,,

The swelling behind the jaw has increased and now involves the other side of the face, giving a round appearance to it.

4th	,,	Temp. A.M. 40.8°C.	P.M. 40.7°C.	Hæmatozoa absent from the blood. Numerous in the tunica vaginalis fluid
5th	,,	,, 40·1°C.	,, 41·3°C.	,, ,,
6th	,,	,, 41·8°C.	,, 41·3°C.	,, ,,
7th	,,	,, 41°C.	,, 41·4°C.	,, ,,
8th	,,	,, 41°C.	,, 41.3°C.	,, ,,
9th	,,	,, 40·7°C.	,, 41·2°C.	,, ,,
10th	,,	,, 40·8°C.	,, 41·2°C.	Hæmatozoa absent from the blood. Numerous in the tunica vaginalis fluid.
11th	,,	,, 41·4°C.	,, 41·3°C.	,, ,,
12th	,,	,, 41·2°C.	,, 41·4°C.	,, ,,
13th	,,	,, 41·2°C.	,, 41·3°C.	,, ,,
14th	,,	,, 41·1°C.	,, 41·3°C.	,, ,,
15th	,,	,, 41·1°C.	,, 41·2°C.	,, ,,
16th	,,	,, 41°C.	,, 41·3°C.	,, ,,
17th	,,	,, 41·1°C.	,, 41·2°C.	,, ,,
18th	,,	,, 40·7°C.	,, 41·1°C.	,, ,,
19th	,,	,, 40·6°C.	,, 41·5°C.	,, ,,
20th	,,	,, 41·2°C.	,, 41·3°C.	,, ,,
21st	,,	,, 41·2°C.	,, 41·2°C.	,, ,,
22nd	,,	,, 40·6°C.	,, 40·8°C.	,, ,,
23rd	,,	,, 40·4°C.	,, 39·1°C.	,, ,,
24th	,,	,, 41·3°C.	,, 41·2°C.	,, ,,
25th	,,	,, 40·6°C.	,, 41·3°C.	,, ,,
26th	,,	,, 41·1°C.	,, 41.2°C.	,, ,,
27th	,,	,, 41°C.	,, 41·3°C.	,, ,,
28th	,,	,, 41°C.	,, 41·1°C.	,, ,,
29th	,,	,, 39·7°C.	,, 41·1°C.	,, ,,
30th	,,	,, 40·7°C.	,, 41·3°C.	,, ,,
31st	,,	,, 40·7°C.	,, 41·2°C.	,, ,,
1st	*September.*—	,, 40·7°C.	,, 41°C.	,, ,,
2nd	,,	,, 40·8°C.	,, 40·8°C.	,, ,,
3rd	,,	,, 40·4°C.	,, 41°C.	,, ,,
4th	,,	,, 41·2°C.	,, 41·1°C.	,, ,,
5th	,,	,, 40·6°C.	,, 41·2°C.	,, ,,
6th	,,	,, 40·8°C.	,, 41·1°C.	,, ,,
7th	,,	,, 41°C.	,, 41°C.	,, ,,
8th	,,	,, 40·7°C.	,, 41°C.	,, ,,
9th	,,	,, 40·7°C.	,, 40·7°C.	,, ,,
10th	,,	,, 40·3°C.	,, 40·8°C.	,, ,,
11th	,,	,, 40·4°C.	,, 40·6°C.	,, ,,
12th	,,	,, 40·3°C.	,, 40·7°C.	,, ,,
13th	,,	,, 40·4°C.	,, 41·2°C.	,, ,,
14th	,,	,, 41°C.	,, 40·8°C.	,, ,,
15th	,,	,, 39·6°C.	,, 41·3°C.	,, ,,
16th	,,	,, 40·5°C.	,, 41·3°C.	,, ,,
17th	,,	,, 40·5°C.	,, 41·3°C.	,, ,,
18th	,,	,, 41·2°C.	,, 41·2°C.	,, ,,

19*th*	*Sept.*—Temp.	A.M.	40·7°C.	P.M.	41·1°C.	Hæmatozoa absent from the blood. Numerous in the tunica vaginalis fluid.	
20*th*	,,	,,	40·7°C.	,,	41·1°C.	,,	,,
21*st*	,,	,,	40·5°C.	,,	40·8°C.	,,	,,
22*nd*	,,	,,	40·7°C.	,,	40·8°C.	,,	,,
23*rd*	,,	,,	40·2°C.	,,	40·8°C.	,,	,,
24*th*	,,	,,	40·6°C.	,,	40·8°C.	,,	,,
25*th*	,,	,,	40·5°C.	,,	40·9°C.	,,	,,
26*th*	,,	,,	40·8°C.	,,	40·8°C.	,,	,,
27*th*	,,	,,	40·3°C.	,,	40·8°C.	,,	,,
28*th*	,,	,,	40·9°C.	,,	40·8°C.	,,	,,
29*th*	,,	,,	41·1°C.	,,	40·6°C.	,,	,,
30*th*	,,	,,	41·3°C.	,,	41·2°C.	,,	,,
1*st*	*October*	,,	40·2°C.	,,	40·8°C.	,,	,,
2*nd*	,,	,,	41·3°C.	,,	41·5°C.	,,	,,
3*rd*	,,	,,	40·1°C.	,,	41·1°C.	,,	,,
4*th*	,,	,,	40·2°C.	,,	41·2°C.	,,	,,
5*th*	,,	,,	40·3°C.	,,	41·1°C.	,,	,,
6*th*	,,	,,	40·6°C.	,,	41·2°C.	,,	,,
7*th*	,,	,,	41°C.	,,	41·1°C.	,,	,,
8*th*	,,	,,	40·5°C.	,,	41°C.	,,	,,
9*th*	,,	,,	40·1°C.	,	41·1°C.	,,	,,
10*th*	,,	,,	40·3°C.	,,	41·2°C.	,,	,,
11*th*	,,	,,	40·3°C.	,,	41·3°C.	,,	,,
12*th*	,,	,,	40·5°C.	,,	40·8°C.	,,	,,
13*th*	,,	,,	40·4°C.	,,	41·1°C.	,,	,,
14*th*	,,	,,	40·4°C.	,,	41·1°C.	,,	,,
15*th*	,,	,,	40·6°C.	,,	41·2°C.	,,	,,
16*th*	,,	,,	39·7°C.	,,	40·3°C.	,,	,,
17*th*	,,	,,	39·8°C.	,,	40·5°C.	,,	,,
18*th*	,,	,,	40·3°C.	,,	40·6°C.	,,	,,
19*th*	,,	,,	40·3°C.	,,	40·6°C.	,,	,,
20*th*	,,	,,	40·4°C.	,,	40·5°C.	,,	,,
21*st*	,,	,,	39·4°C.	,,	40·8°C.	,,	,,
22*nd*	,,	,,	39·7°C.	,,	40·7°C.	,,	,,
23*rd*	,,	,,	40°C.	,,	40·8°C.	,,	,,
24*th*	,,	,,	40·2°C.	,,	40·8°C.	,,	,,
25*th*	,,	,,	40·4°C.	,,	40·7°C.	,,	,,
26*th*	,,	,,	40·5°C.	,,	41°C.	,,	,,
27*th*	,,	,,	40·1°C.	,,	40·7°C.	,,	,,
28*th*	,,	,,	40°C.	,,	40·6°C.	,,	,,
29*th*	,,	,,	40·1°C.	,,	41·2°C.	,,	,,
30*th*	,,	,,	40·5°C.	,,	40·3°C.	,,	,,
31*st*	,,	,,	40·4°C.	,,	41°C.	Hæmatozoa are absent from the blood. Absent from the tunica vaginalis fluid.	
1*st*	*November*	,,	40·7°C.	,,	41·1°C.	,,	,,
2*nd*	,,	,,	40·6°C.	,,	41°C.	,,	,,
3*rd*	,,	,,	40·6°C.	,,	41·1°C.	,,	,,
4*th*	,,	,,	41·6°C.	,,	41·5°C.	,,	,,
5*th*	,,	,,	41·4°C.	,,	41°C.	,,	,,
6*th*	,,	,,	40·5°C.	,,	41°C.	,,	,,
7*th*	,,	,,	40·6°C.	,,	40·7°C.	,,	,,
8*th*	,,	,,	39·3°C.	,,	39·7°C.	,,	,,
9*th*	,,	,,	38·3°C.	Died at 11-30 A.M.			

AUTOPSY at 1 P.M.

Localized peritonitis (perihepatitis).

Stomach.—Apparently healthy.

Kidneys.—Apparently healthy.

Spleen.—Attached to the stomach by firm bands of organised lymph.

Testicles.—The walls of the tunica vaginalis on both sides are firmly adherent to each other. The testicles are hard and the cord considerably thickened.

Brain.—The superficial veins are replete with dark coloured blood, the convolutions flattened, and the lateral ventricles dilated with colourless fluid.

Remarks.—This animal was inoculated with 1 c.c. of blood which contained swarms of hæmatozoa previous to death, and was taken from the heart of a horse, five and a quarter hours *Post-mortem.*

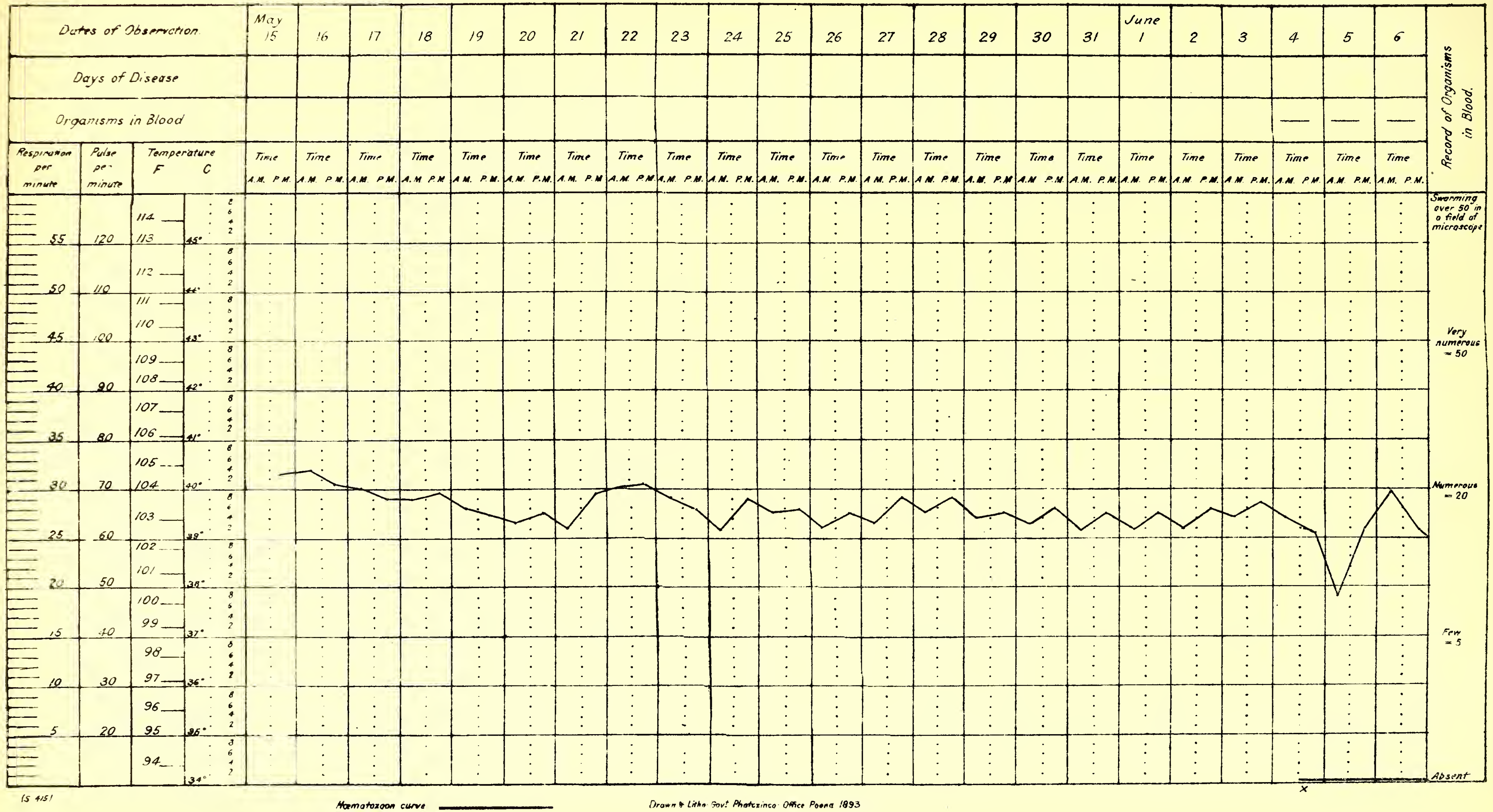
The hæmatozoon appeared in small numbers after an incubation-period of six days and continued to be present off and on for fifteen days; after this it was absent for twenty-six days. From this time until October 30th, during a period of 103 days, the hæmatozoon was always absent from the blood, but present during the whole of this time in the fluid drawn from the tunica vaginalis.

The chief pathological lesions found were, the perihepatitis, the obliteration of the cavities of the tunicæ vaginales testes, and the flattening of the convolutions of the brain, due to the presence of fluid in the lateral ventricles.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Goat III. Subcutaneously Inoculated with 1·0cc of blood from Horse XXI. Age Sex Colour

Disease "Surra" Date of Inoculation, 4. June 91. Result, Death. Date of Result, 9. 11. 1891. Register No. III.



(S 415)

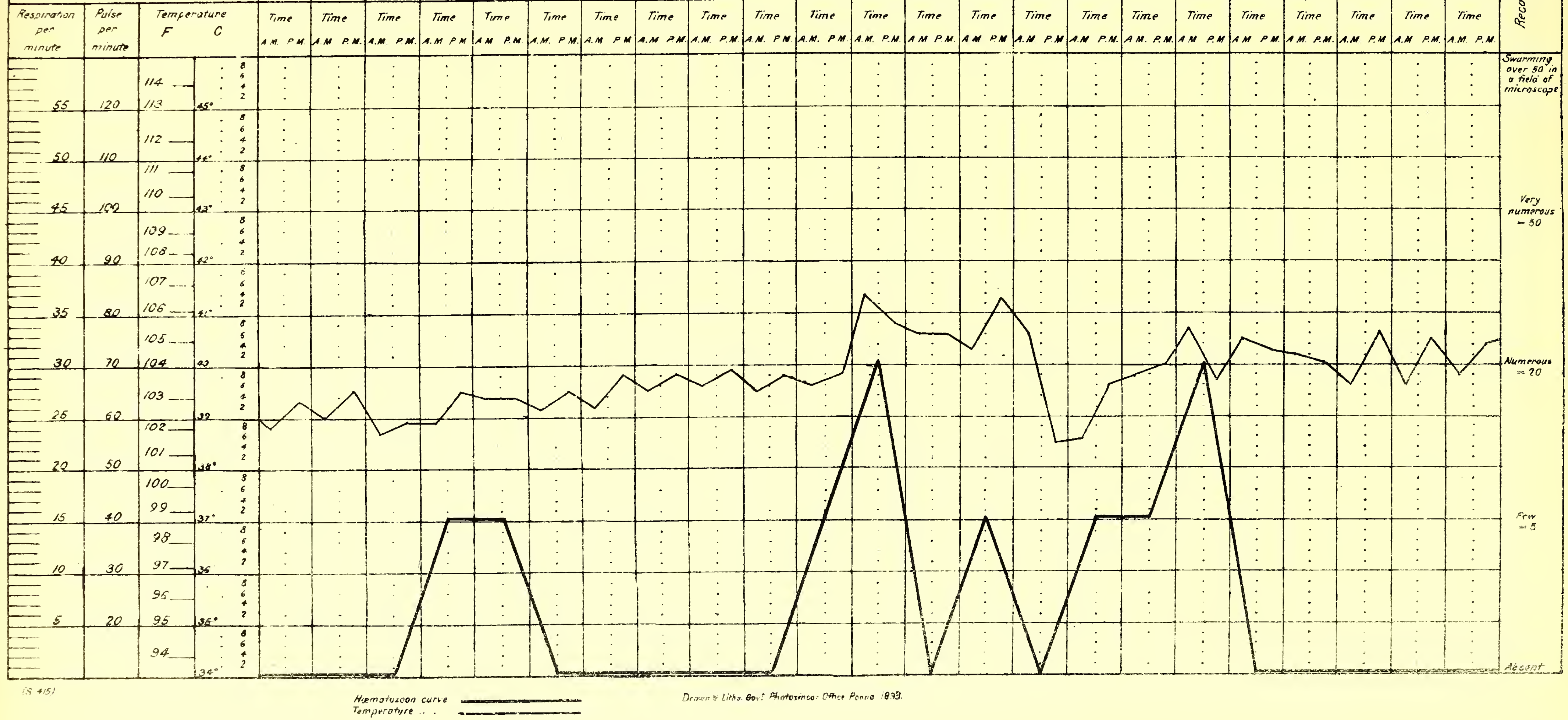
Drawn & Litho. Govt. Photozinco. Office Poona 1893

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

________ Age ________ Sex ________ Colour ________

Disease ________ Date of ________ Result ________ Date of Result ________ Register No. ________

Dates of Observation	June 7	8	9	10	11	12	13	14	15	16	17	13	19	20	21	22	23	24	25	26	27	28	29	Record of Organisms in Blood.
Days of Disease				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
Organisms in Blood	—	—	—	F	F	—	—	—	—	—	F	N	—	F	—	F	F	N	—	—	—	—	—	



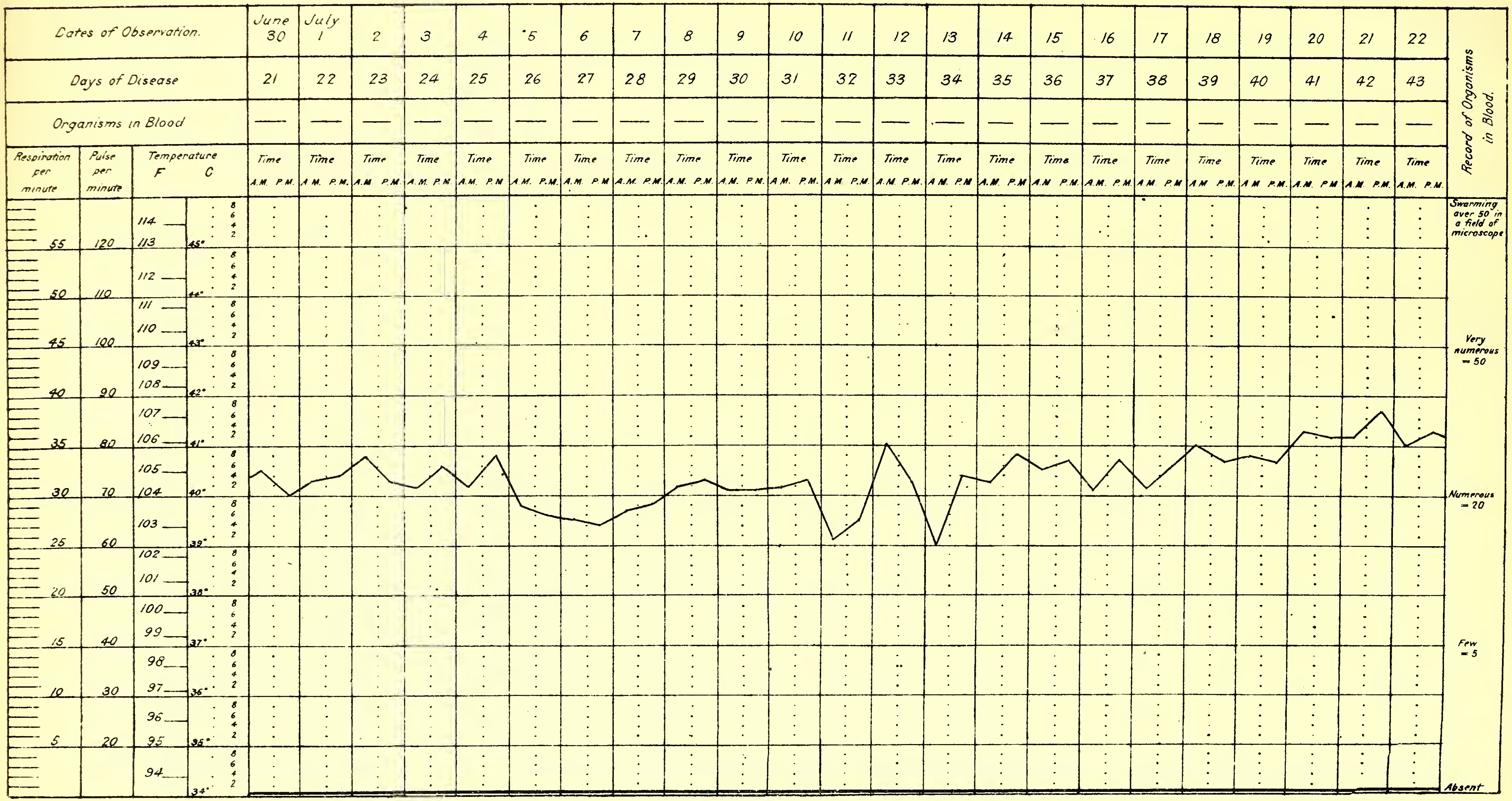
(S 415)

Drawn & Litho. Govt. Photozinco: Office Poona 1893.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age ______ Sex ______ Colour ______

Disease ______ Date of ______ Result ______ Date of Result ______ Register No. ______



(S 4/5)

Hæmatozoon curve ————

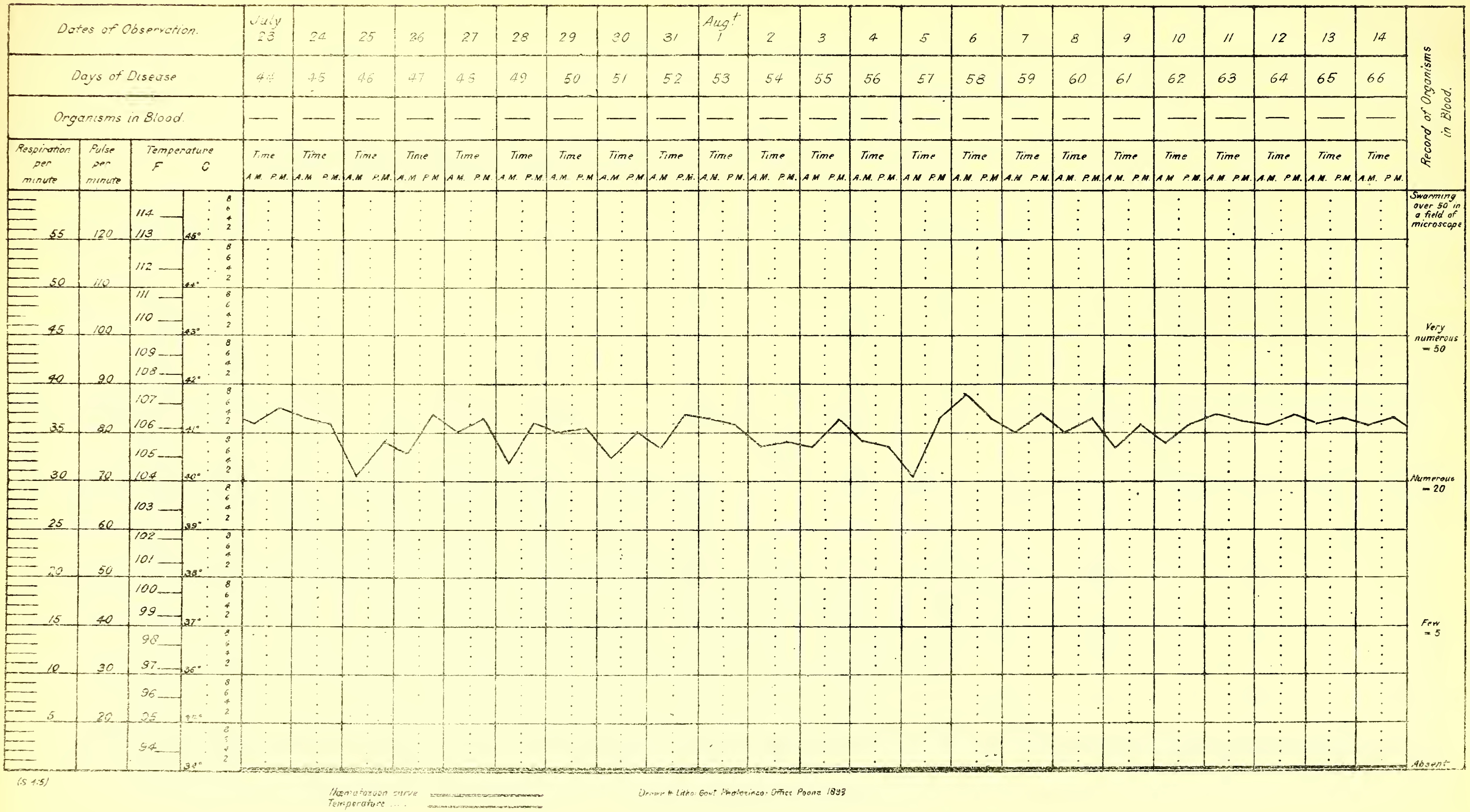
Temperature .... ————

Drawn & Litho: Govt. Photozinco: Office Poona 1893

RECORDS of TEMPERATURE, PULSE and RESPIRATION.

Age ______ Sex ______ Colour ______

Disease ______ Date of ______ Result ______ Date of Result ______ Register No. ______



Dates of Observation.	July 23	24	25	26	27	28	29	30	31	Augt 1	2	3	4	5	6	7	8	9	10	11	12	13	14
Days of Disease	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66
Organisms in Blood.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

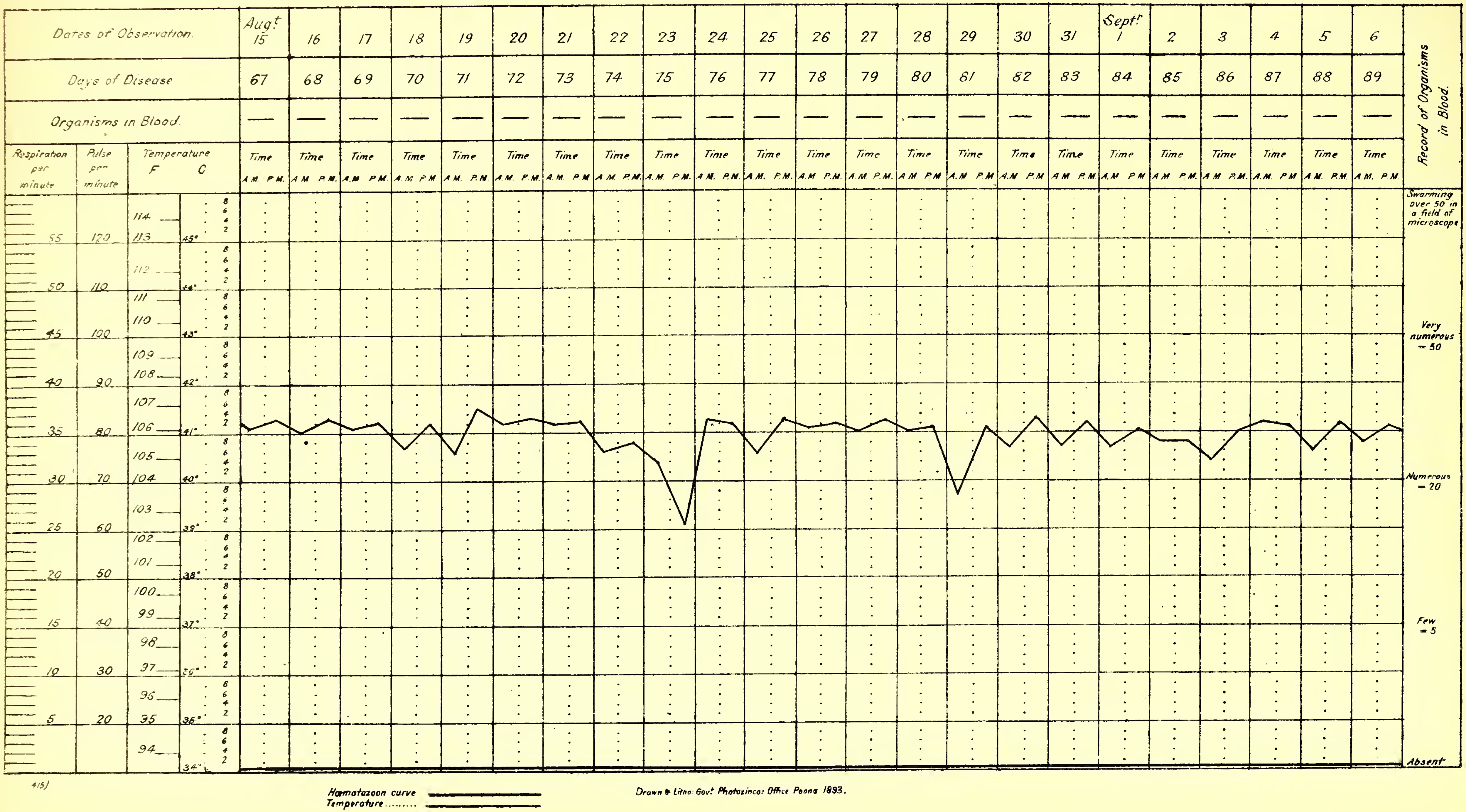
(S 4:5)

Drawn & Litho: Govt. Photozinco: Office Poona 1893

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age ______ Sex ______ Colour ______

Disease ______ Date of ______ Result ______ Date of Result ______ Register No. ______



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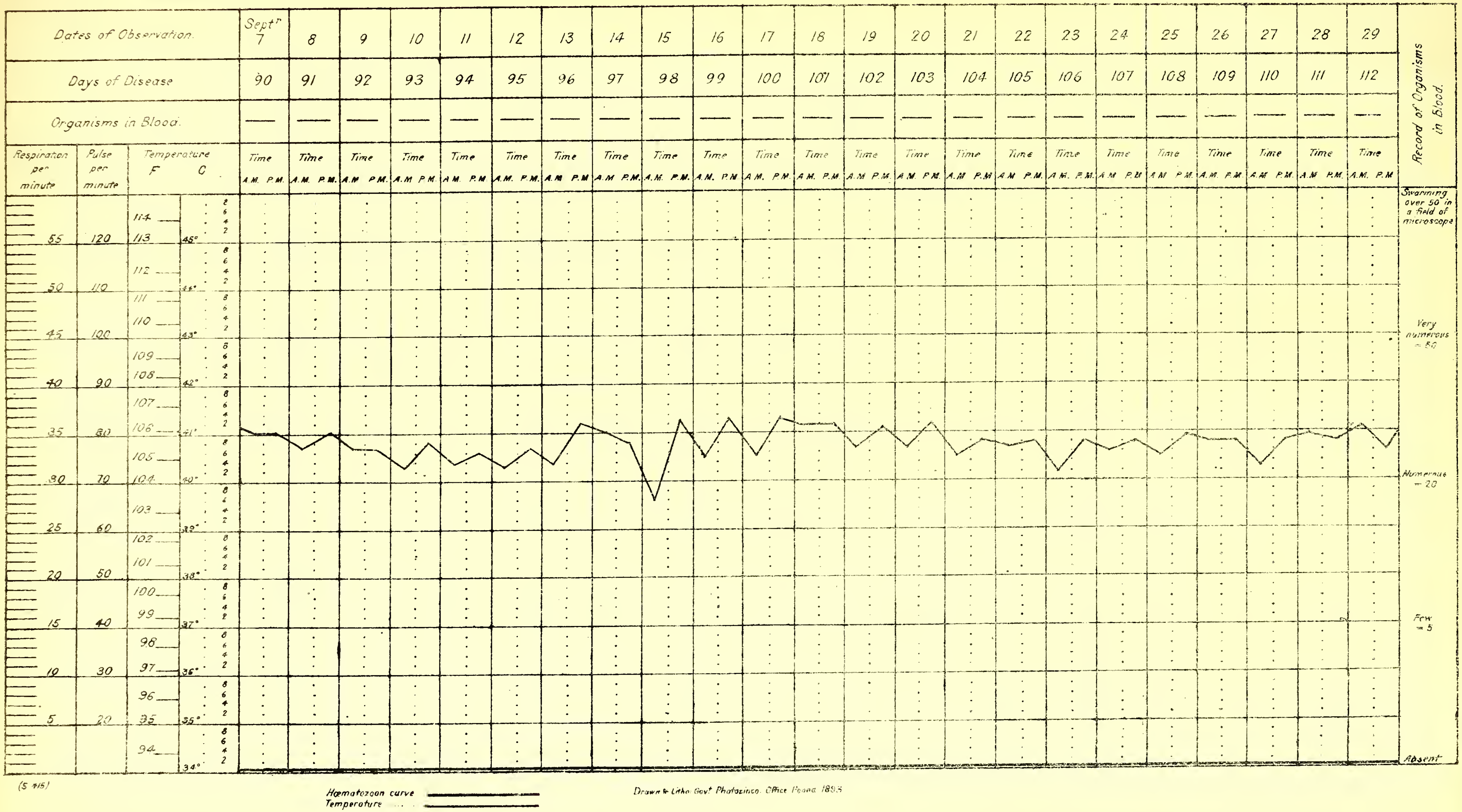
Drawn & Litho: Gov.t Photozinco: Office Poona 1893.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age ______ Sex ______ Colour ______

Disease ______ Date of ______ Result ______ Date of Result ______ Register No. ______



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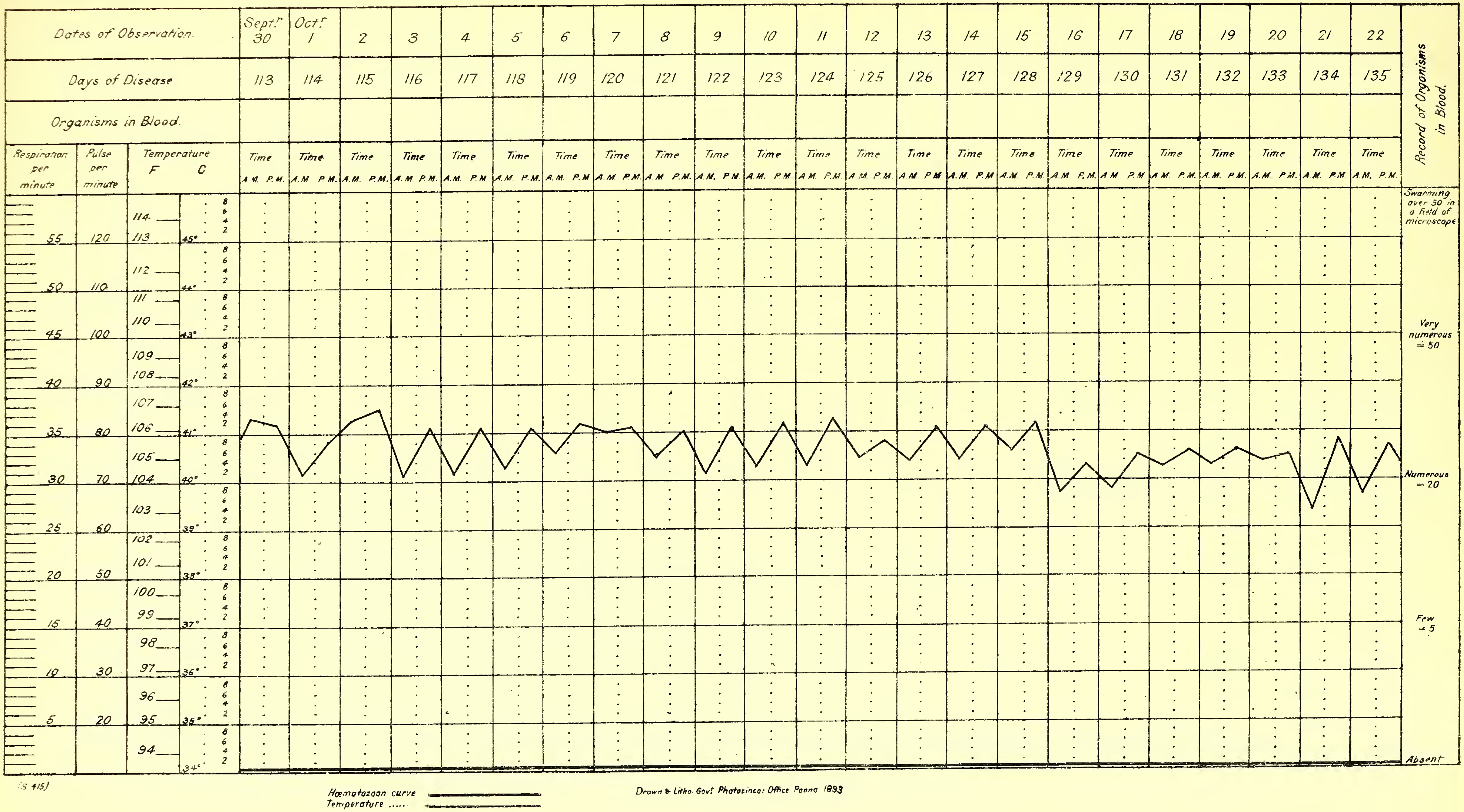
Drawn & Litho. Govt Photozinco. Office Poona 1893

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age ______ Sex ______ Colour ______

Disease ______ Date of ______ Result ______ Date of Result ______ Register No. ______



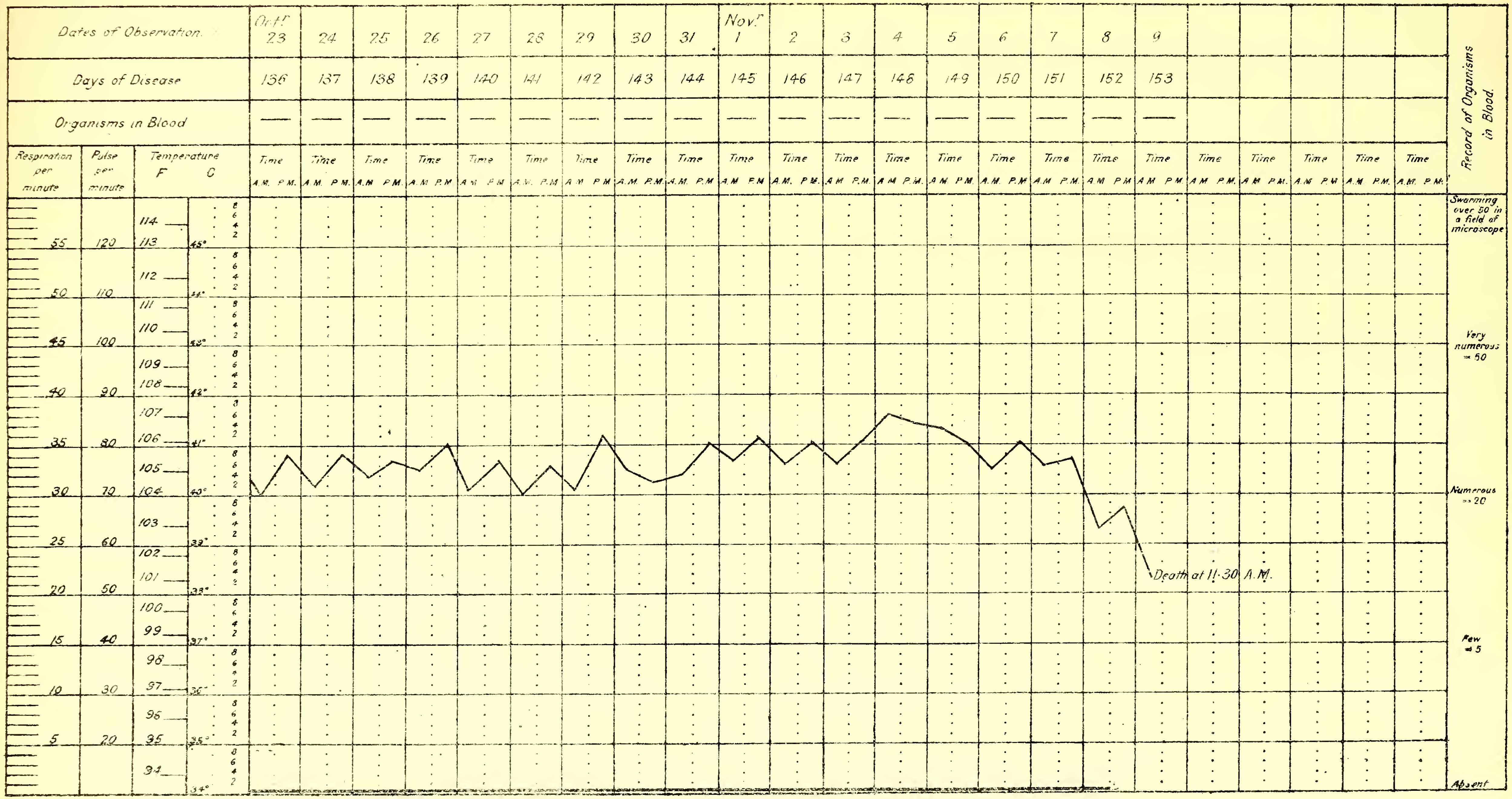
(S 415)

Drawn & Litho: Govt. Photozinco: Office Poona 1893

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age ______ Sex ______ Colour ______

Disease ______ Date of ______ Result ______ Date of Result ______ Register No. ______



(S 415)

Hæmatozoon curve
Temperature ....

Drawn & Litho. Govt. Photozinco Office Poona 1893

No. I.—RABBIT.

2nd November 1890, 10 A.M.—Inoculated this animal subcutaneously in the left ear with ·3 c. c. of blood in which Surra hæmatozoa were very numerous, from Horse No. II. Temp. P.M. 39·4°C.

3rd.—Temp. A.M. 39·3°C. P.M. 39·6°C. Hæmatozoa absent from the blood.

4th „ 39·4°C. „ 39·6°C. „ „

5th „ 39·5°C. „ 39·8°C. „ „

6th „ 39·8°C. „ 40·5°C. „ „

7th.—The animal looks dull; there is some swelling and œdema round the seat of inoculation, which presents a purple colour. Temp. A.M. 40·8°C. Hæmatozoa few in the blood. Temp. P.M. 41°C. Respiration accelerated.

8th.—Temp. A.M. 40·7°C. Blood examined at 10 A.M. Hæmatozoa absent from the blood. Temp. P.M. 41°C.

9th.—Temp. A.M. 40·8°C. Blood examined at 12·30 P.M. Hæmatozoa absent from the blood. Subsequent examination of fluid from the seat of inoculation. The œdema being only slight, revealed the presence of a number of hæmatozoa, about 8 to 10 seen in one field of the microscope. Temp. P.M. 41·2°C.

10th.—Temp. A.M. 40·8°C. P.M. 41·2°C. Hæmatozoa absent from the blood.

11th „ 41·2°C. „ 41·8°C. „ few in the blood.

12th „ 41·3°C. „ 42°C. The œdematous fluid from the inoculated ear swarms with Surra hæmatozoa. In four specimens of blood taken from the other ear, no hæmatozoa are present.

13th.—Temp. A.M. 41·3°C. P.M. 41·5°C. Hæmatozoa absent from the blood.

14th „ 40·3°C. „ 41·5°C. „ „

15th „ 41·2°C. „ 41·4°C. „ „

16th „ 40·7°C. „ 41·1°C. „ „

17th „ 42°C. „ 40·7°C. „ „

18th „ 41·1°C. „ 40·4°C. „ „

19th „ 40·5°C. „ 40·8°C. „ „

The inoculated ear appears less œdematous, but the animal is weak and there is incontinence of urine.

20th.—Temp. A.M. 40·6°C. P.M. 40·7°C. Hæmatozoa absent from the blood.

21st „ 41·2°C. „ 40·6°C. There is some swelling and œdema of the upper lip. One hæmatozoon only was seen in several specimens of the blood examined, but they were numerous in the fluid from the swelling in the new position.

22nd.—Temp. A.M. 41°C. P.M. 41·1°C. Hæmatozoa absent from the blood.

23rd „ 40·4°C. „ 41·4°C. „ few in the blood.

The inspissated pus taken from the subcutaneous tissue of the scrotum on the right side, contains very numerous and large hæmatozoa.

24th.—Temp. A.M. 40·6°C. P. M. 41·5°C. Hæmatozoa absent from the blood.

25th „ 40·3°C. „ 40·1°C. „ „

26th „ 40·3°C. „ 40·8°C. „ few in the blood.

27th „ 40·6°C. „ 41·2°C. „ „

28th „ 40·6°C. „ 41°C. „ absent from the blood.

29th „ 40·5°C. „ 40·9°C. „ „

30th „ 40·4°C. „ 40·7°C. „ numerous in the blood.

1st December.—Temp. A.M. 40·7°C. P.M. 40·2°C. Hæmatozoa numerous in the blood.

2nd „ 40·6°C. „ 40·9°C. „ „

3rd „ 39·9°C. „ 40·1°C. Hæmatozoa absent from the blood.

The urine is of a saffron colour; evidently some irritation of bladder. There is frequent cough, and catarrh of the nasal passages.

4th.—Temp. A.M. 40·2°C. P.M. 40·7°C. Hæmatozoa few in the blood.

5th „ 40·5°C. „ 39·6°C. „ „

6th „ 39·9°C. „ 40·5°C. „ absent from the blood.

7th „ 40·4°C. „ 41·1°C. „ „

There is a discharge from the nose this morning, but it contains no hæmatozoa. The serum taken from the inoculated ear is swarming, and the blood taken from the opposite ear contains numerous hæmatozoa. The red blood corpuscles have run together and become confluent, so that one cannot discern individual ones.

8th Dec.—Temp. A.M. 40·3°C. P.M. 40·3°C. Hæmatozoa absent from the blood.
9th „ 40·1°C. „ 41·1°C. „ few in the blood.
10th „ 40°C. „ 40°C. „ „
11th.—Death at 3 A.M.

AUTOPSY AT 12·30 P.M.

The body is poorly nourished; the under-surface of the abdomen is stained yellow with urine pigment; there is swelling of the integument of the nose, mouth and eyes. Yellow creamy pus exudes from both nostrils and the eye-lids are occluded. The œdema of ears so noticeable during life had almost disappeared. On opening the chest, the heart and lungs bulge forward. The lungs present a normal pink colour on their inferior surface, but on removing them from the thorax, the superior surfaces present numerous localized patches of emphysema. *On section* there exudes from the lungs on pressure a frothy, slightly blood-stained fluid.

Heart.—All the cavities of this organ are distended to their utmost, but there are no endocardial extravasations.

Liver.—Appears healthy.

Spleen.—Small, tissue firm. *On section,* apparently healthy.

Kidneys.—Nothing pathological.

Stomach.—External appearance healthy, with the exception of the pyloric end of the organ. The valve appears considerably increased in size and hard to the touch.

On section the mucous membrane is apparently healthy, but the wall of the organ is found to be considerably increased in thickness.

Duodenum.—Distended to double its usual capacity from generation of gas. No enlargement of mesenteric glands.

Bladder.—Greatly distended with urine.

Remarks.—This animal was inoculated with ·3 C.C. of blood, containing numerous hæmatozoa, from the horse.

The period of incubation occupied five days. The hæmatozoon was then found in the general circulation. Subsequently on several occasions the organisms could not be found in the blood of the general circulation, although it was present in large numbers in the fluid from the seat of inoculation. The time which elapsed between the inoculation and death was thirty-nine days. The chief pathological lesions found at the autopsy were, the presence of localized emphysema of the lungs and the increase in thickness of the walls of the stomach at the pyloric extremity.

No. II. RABBIT.

2nd November 1890.—Inoculated subcutaneously in the right ear with ·3 C.C. of blood from Horse No. II., in whose blood, hæmatozoa were very numerous. Temp. A.M. 39·6°C. Temp. P.M. 39·9°C.

3rd.—Temp. A.M. 39·7°C. P.M. 39·9°C. No hæmatozoa in the blood.
4th „ 39·5°C. „ 39·8°C. „ „
5th „ 39·6°C. „ 39·9°C. „ „
6th „ 39·4°C. „ 39·9°C. „ „

7th.—The inoculated ear presents numerous small mulberry petechiæ, somewhat light in colour. There are no hæmatozoa in the blood. Temp. A.M. 39·8°C. Temp. P.M. 40·2°C.

8th.—Temp. A.M. 40°C. There are no hæmatozoa present in the blood. Temp. P.M. 40·5°C.

9th.—The serous exudation from the seat of inoculation contains swarms of hæmatozoa; 60 counted in one field. The ear is swollen to three or four times its normal size. The purple colour is still present over the whole œdematous portion. Temp. A.M. 40·2°C. The animal is extremely lively. Four cover-glass specimens of blood, taken from the other ear, were examined with great care, but no hæmatozoa were discovered therein. There are however present in the blood, numerous small highly refractile bodies which appear to possess more than a Brownian movement. Some of the red corpuscles are vacuolated and lie individually separate, with no tendency to form rouleaux. Temp. P.M. 40·8°C.

10th.—The serous exudation taken from the seat of inoculation contains numerous Surra hæmatozoa. The blood taken direct from a vessel presents no other features than the presence of a few refractile bodies. There are no hæmatozoa in the blood. Temp. A.M. 40·6°C. P.M. 41·2°C.

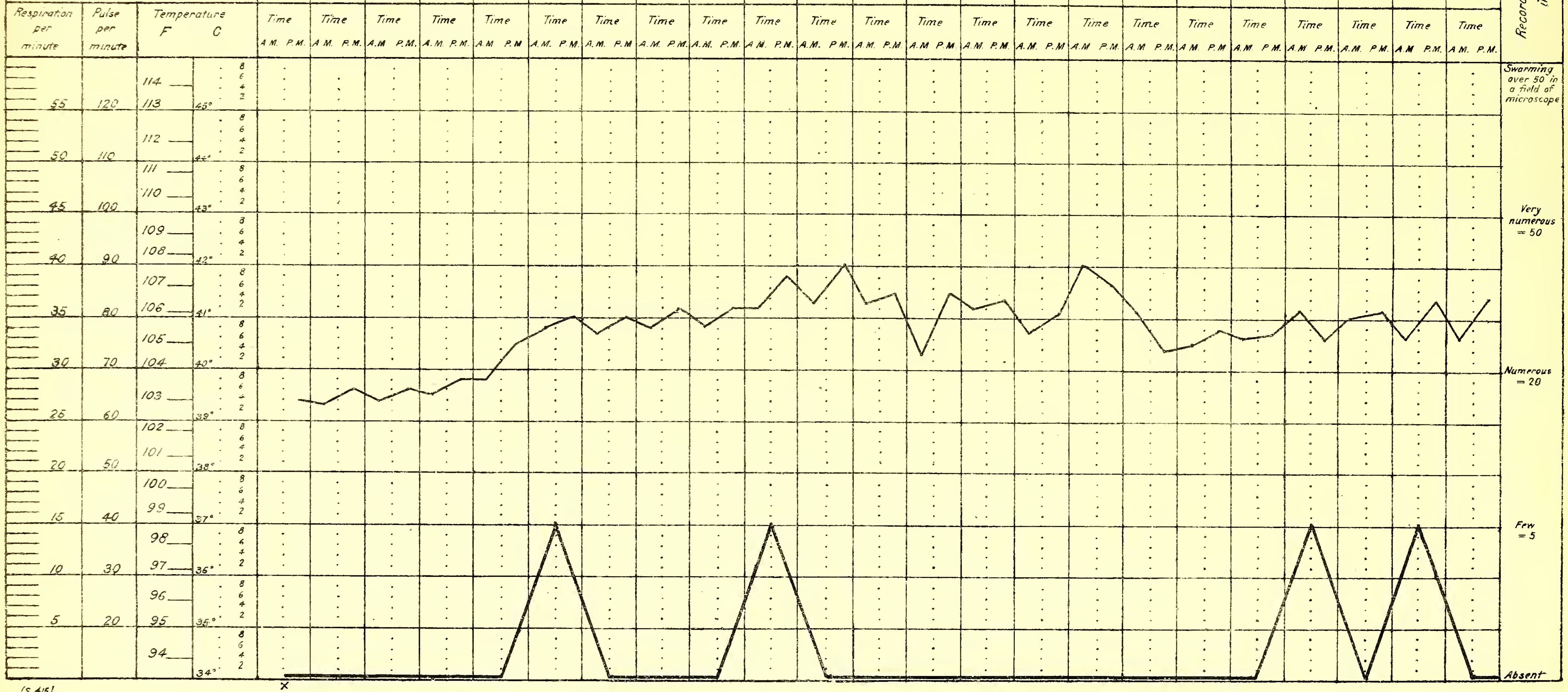
11th.—The swelling and œdema at the seat of inoculation still persist and are dark in colour. Temp. A.M. 40·8°C. Hæmatozoa few in the blood. Temp. P.M. 41·2°C.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Rabbit. Subcutaneously inoculated with 0·3cc of blood taken from Horse No. 11. ______ Age ______ Sex ______ Colour ______

Disease "Surra" ______ Date of Inoculation, Nov: 2. 1890. ___ Result, Death ______ Date of Result, 11. 12. 90. __ Regisier No. I. ______

Dates of Observation.	Nov.r 2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Days of Disease						1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Organisms in Blood.		—	—	—	—	F	—	—	—	F	—	—	—	—	—	—	—	—	—	F	—	F	—



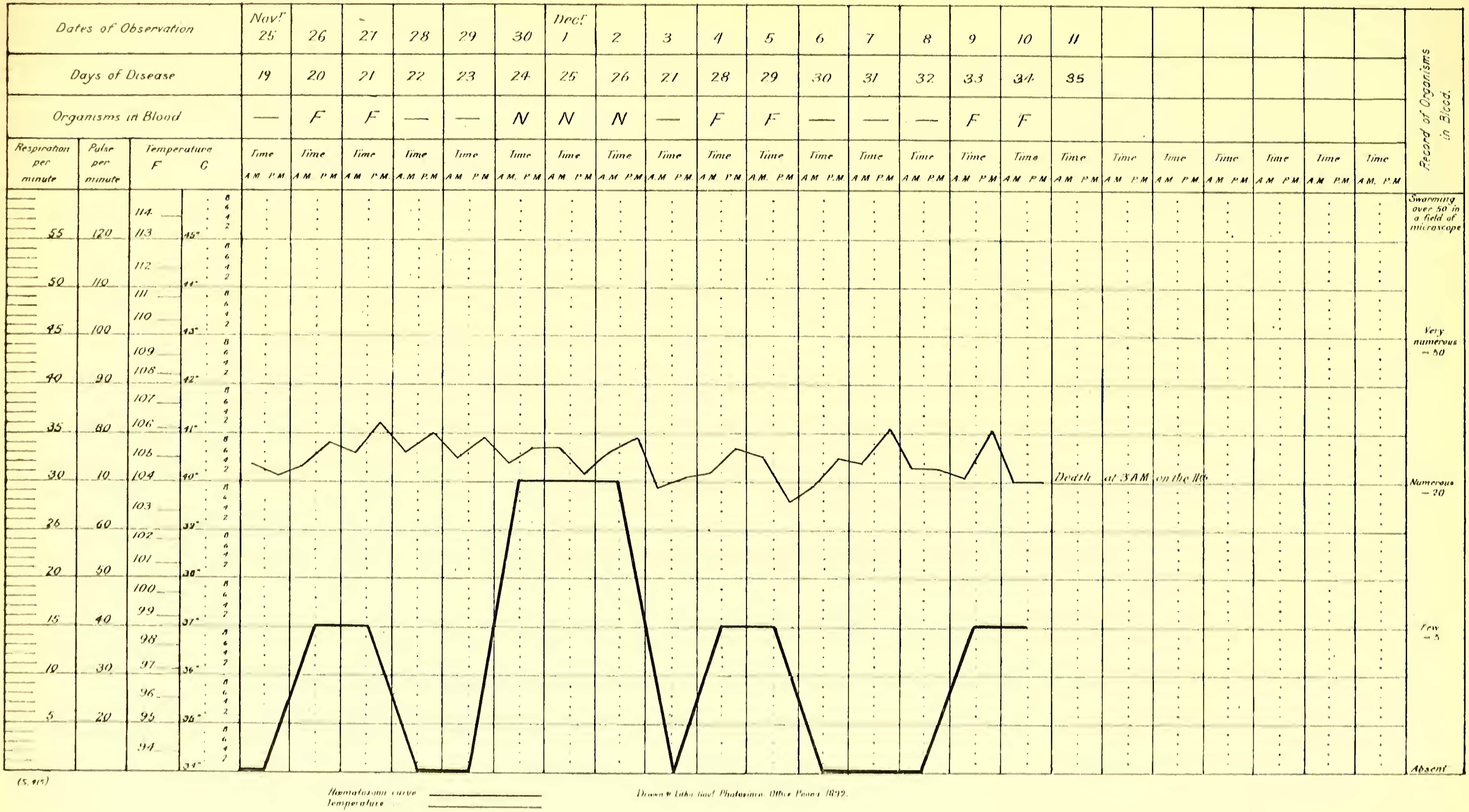
(S 415)

Hæmatozoon curve
Temperature.........

Drawn & Litho: Govt. Photozinco: Office Poona 1892.

Age ______ Sex ______ Colour ______

Disease ______ Date of ______ Result ______ Date of Result ______ Register No. I ______



Dates of Observation	Nov.r 25	26	27	28	29	30	Dec.r 1	2	3	4	5	6	7	8	9	10	11						
Days of Disease	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35						
Organisms in Blood	—	F	F	—	—	N	N	N	—	F	F	—	—	—	F	F							

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Hæmatozoon curve
Temperature

Drawn & Litho. Govt. Photozinco. Office Poona 1892.

12th.—Temp. A.M. 40·7°C. The œdematous fluid from the inoculated ear contains numerous hæmatozoa. There are none however in the blood. Temp. P.M. 41·3°C.

13th.—Temp. A.M. 41·4°C. The œdematous fluid from the inoculated ear again contains numerous hæmatozoa, but there are none in the blood. Temp. P.M. 41·7°C.

14th.—Temp. A.M. 40·6°C. The œdema of the right ear extends from the base to the tip. The left ear presents two small areas of œdema on the hairy side, about ½ inch in diameter. The serum examined contains numerous hæmatozoa; but the blood does not contain any. Temp. P.M. 41·7°C.

15th.—Temp. A.M. 41·5°C. One hæmatozoon observed in two specimens of the blood. Temp. P.M. 41·8°C.

16th.—Temp. A.M. 41·2°C. No hæmatozoa in the blood, but three or four were seen in one preparation of fluid from the œdematous ear. Temp. P.M. 41°C.

17th.—Temp. A.M.	41°C.	P.M.	41·4°C.	No hæmatozoa	in the blood.
18th „	41·5°C.	„	41·°C.	„	„
19th „	41·4°C.	„	41·4°C.	„	„
20th „	41·3°C.	„	41·7°C.	„	„
21st „	41·6°C.	„	41·8°C.	„	„

An immense number of refractile bodies are present in the serum from the ear.

22nd	Temp. A.M.	41·6°C.	P.M.	42·2°C.	No hæmatozoa	in the blood.
23rd	„	41·2°C.	„	40·2°C.	„	„
24th	„	41·7°C.	„	41·9°C.	„	„
25th	„	41·3°C.	„	41·5°C.	„	„
26th	„	40·7°C.	„	41·5°C.	„	„
27th	„	40·2°C.	„	41·7°C.	„	„
28th	„	41·3°C.	„	41·9°C.	„	„
29th	„	40·6°C.	„	42°C.	„	„
30th	„	41·5°C.	„	41·8°C.	„	„
1st December	„	41·4°C.	„	41·8°C.	„	„
2nd	„	41·3°C.	„	41·6°C.	„	„
3rd	„	41·2°C.	„	41·6°C.	„	„

The animal is dull, has some difficulty in breathing, a troublesome cough, and a slight muco-purulent discharge from the nostrils.

4th.—Temp. A.M.	40·7°C.	P.M.	41·6°C.	No hæmatozoa	in the blood.
5th „	41·2°C.	„	41·6°C.	„	„
6th „	41·4°C.	„	41·8°C.	„	„
7th „	41·6°C.	„	41·4°C.	„	„

There are a few hæmatozoa present in the serum from the inoculated ear.

8th.—Temp. A.M.	40·1°C.	P.M.	41·4°C.	No hæmatozoa	in the blood.
9th „	41·2°C.	„	41·8°C.	„	„
10th „	41·3°C.	„	41·1°C.	„	„
11th „	41·1°C.	„	40·8°C.	„	„
12th „	40·8°C.	„	41·3°C.	„	„
13th „	40·6°C.	„	40·9°C.	Few hæmatozoa	in the blood.

The difficulty of breathing is aggravated.

The expiratory effort is greatly prolonged.

14th.—Temp. A.M.	40°C.	P.M.	40·5°C.	Hæmatozoa	few in the blood.
15th „	39·6°C.	„	41·2°C.	„	„
16th „	40·1°C.	„	40·7°C.	„	„
17th „	39·9°C.	„	41°C.	„	absent from the blood.
18th „	40·1°C.	„	39·5°C.	„	„
19th „	38·9°C.	„	40·3°C.	„	few in the blood.
20th „	39·1°C.	„	38·9°C.	„	„

21st.—Found dead this morning.

AUTOPSY.—Body emaciated.

Thorax.—No fluid in the pleural cavities.

Lungs.—Completely fill the thoracic cavity. Some portions of the lungs present localized emphysema. *On section* blood and some frothy mucus exude.

Heart.—All the cavities are distended with blood clots. No extravasations.

Liver.—Is normal to the naked eye ; as also spleen, kidneys &c. *on section.*

Stomach. Healthy.

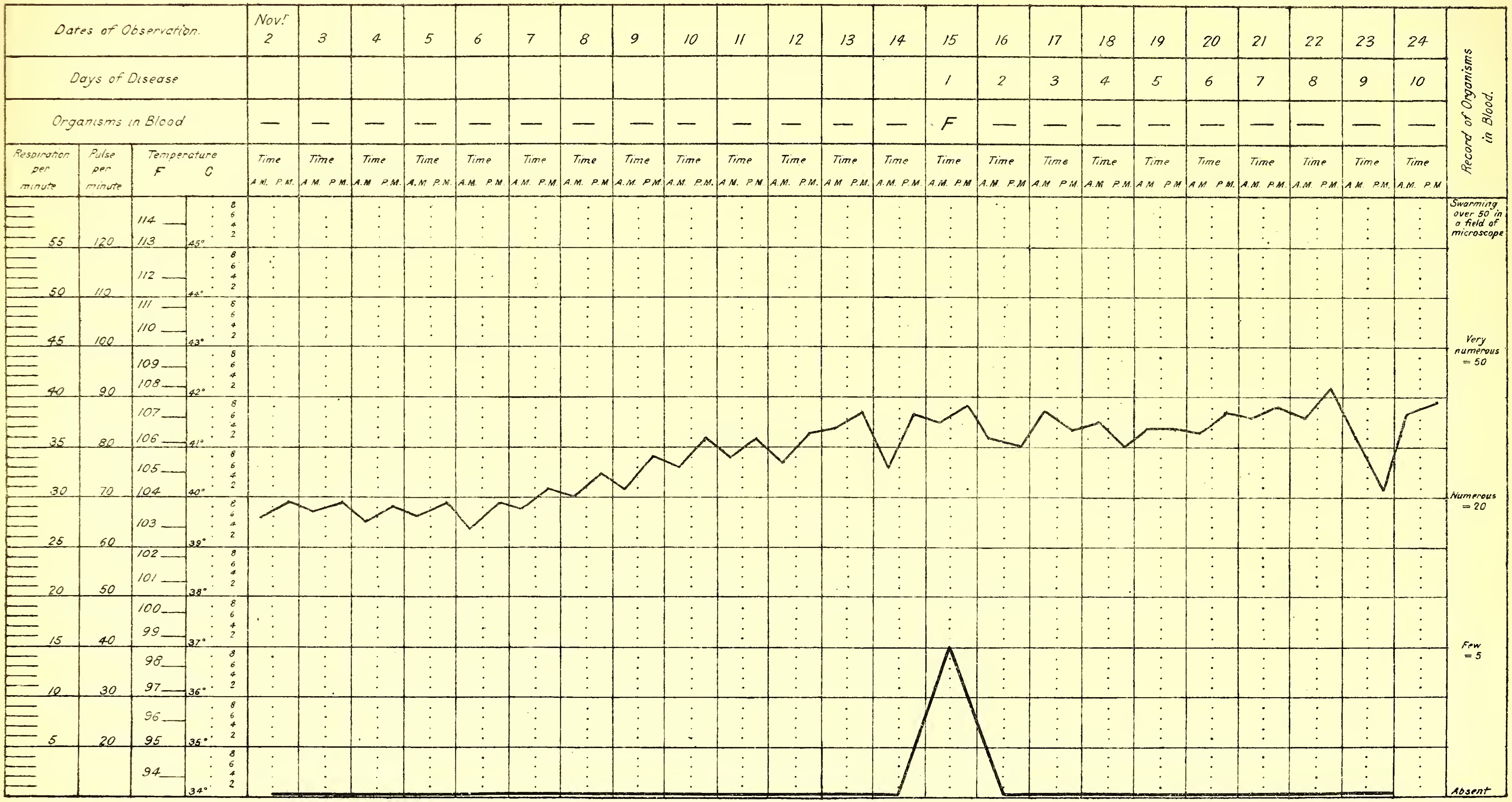
Bladder.—Healthy.

Remarks.—This animal was inoculated with ·3 cc. of blood containing very numerous hæmatozoa, from the horse. The period elapsing between the inoculation and the first appearance of the organism in the blood occupied nine days. But two days previous to that, the serous exudation collected for microscopical examination from the seat of inoculation, contained swarms of hæmatozoa. A few days later however the organism disappeared from the blood and remained absent with few exceptions until death. The chief symptoms presented by the animal during the course of the disease were, difficulty in breathing, a troublesome cough, and a slight muco-purulent discharge from the nostrils. From the date of inoculation until death occupied a period of forty-nine days.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Rabbit. Subcutaneously inoculated with 0·3 cc of blood taken from Horse No. 11. Age ______ Sex ______ Colour ______

Disease, "Surra" ______ Date of Inoculation, Nov. 2. 1890 ______ Result, Death ______ Date of Result, 21. 12. 90 Register No. II. ______



(S 415)

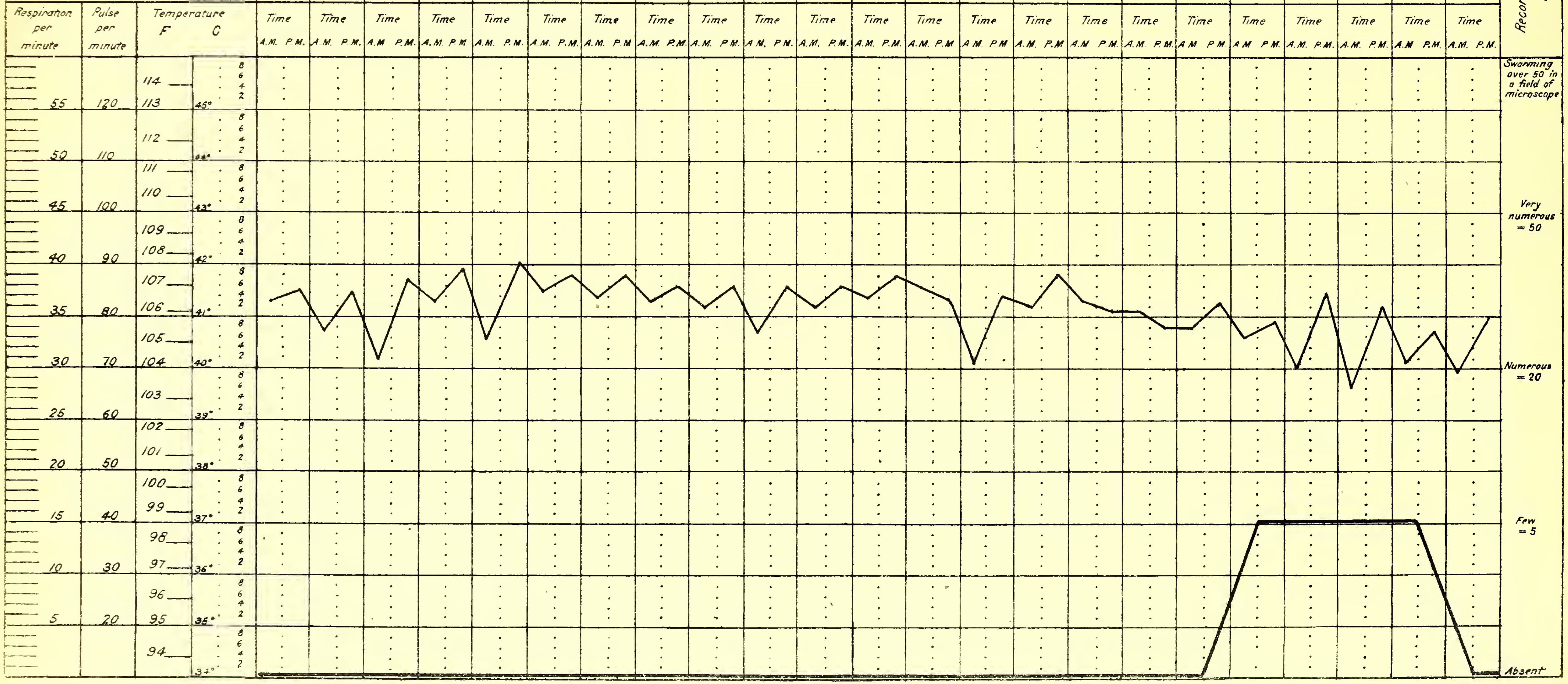
Hæmatozoon curve
Temperature ......

Drawn & Litho: Govt. Photozinco: Office Poona 1892.

Age ______ Sex ______ Colour ______

Disease ______ Date of ______ Result ______ Date of Result ______ Register No. II. ______

Dates of Observation.	Nov.r 25	26	27	28	29	30	Dec.r 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Days of Disease	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
Organisms in Blood.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	F	F	F	F	—



(S 43)

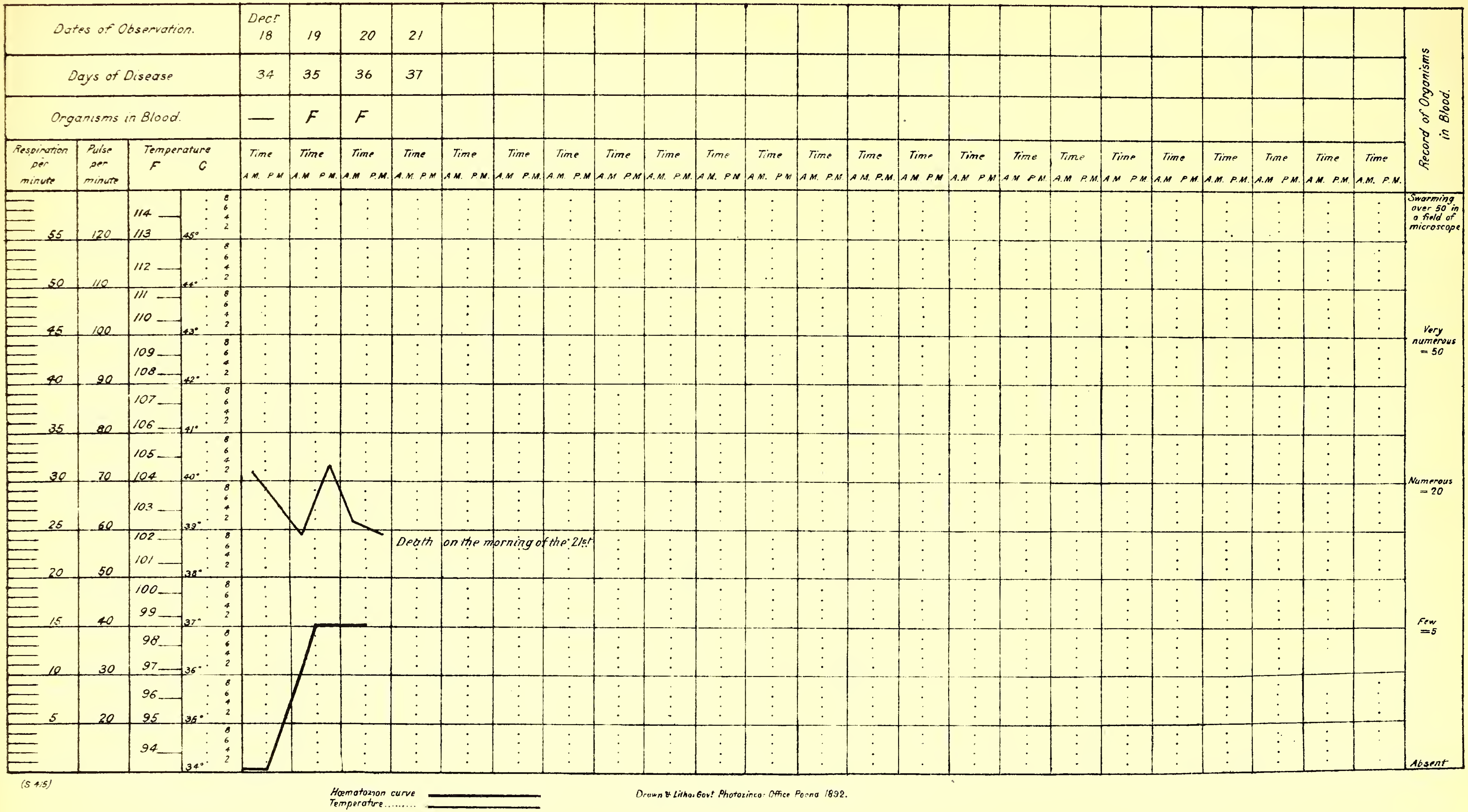
Hœmatozoon curve
Temperature ....

Drawn & Litho: Govt. Photozinco: Office Poona 1892.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age ______ Sex ______ Colour ______

Disease ______ Date of ______ Result ______ Date of Result ______ Register No. II. ______



(S 4/5)

Drawn & Litho: Govt. Photozinco: Office Poona 1892.

No. I GUINEA-PIG.

2nd November 1890—Inoculated in the Right Inguinal Region with 1 c. c. of blood from Horse No. II.

3rd	„	Temp. A.M. 39·3°C.	P.M. 39·4°C.	No hæmatozoa in the blood.
4th	„	„ 39·5°C.	„ 39·8°C.	„ „ „
5th	„	„ 39·4°C.	„ 39·7°C.	„ „ „
6th	„	„ 39·5°C.	„ 39·6°C.	„ „ „
7th	„	„ 39·5°C.	„ 39·7°C.	„ „ „

A gland is enlarged and indurated, in the right inguinal region.

8th	„	Temp. A.M. 39·5°C.	P.M. 39·8°C.	No hæmatozoa in the blood.
9*th*	„	„ 39·3°C.	„ 39·6°C.	„ „ „
10*th*	„	„ 39·2°C.	„ 39·4°C.	„ „ „
11*th*	„	„ 39·3°C.	„ 39·5°C.	„ „ „
12*th*	„	„ 39·4°C.	„ 39·6°C.	„ „ „
13*th*	„	„ 39·1°C.	„ 39·4°C.	Few „ „
14*th*	„	„ 39·4°C.	„ 39·2°C.	Hæmatozoa numerous in the blood, very torpid.
15*th*	„	„ 39·2°C.	„ 39·4°C.	Hæmatozoa numerous in the blood.
16*th*	„	„ 39°C.	„ 39·8°C.	„ „
17*th*	„	„ 39·6°C.	„ 39·6°C.	„ „
18*th*	„	„ 39·4°C.	„ 39·5°C.	„ „
19*th*	„	„ 39·7°C.	„ 39·6°C.	„ „(torpid).
20*th*	„	„ 39·9°C.	„ 40·3°C.	„ „(active).
21*st*	„	„ 39·2°C.	„ 39·6°C.	„ „ „
22*nd*	„	„ 39·7°C.	„ 39·6°C.	„ few in the blood.
23*rd*	„	„ 39·9°C.	„ 39·7°C.	„ numerous „
24*th*	„	„ 39·3°C.	„ 39·9°C.	„ few in the blood.
25*th*	„	„ 40·1°C.	„ 40·3°C.	„ numerous „
26*th*	„	„ 39·8°C.	„ 39·8°C.	„ „
27*th*	„	„ 39·7°C.	„ 40·1°C.	„ „
28*th*	„	„ 40°C.	„ 40·2°C.	„ „
29*th*	„	„ 40·1°C.	„ 40·3°C.	„ „
30*th*	„	„ 40·1°C.	„ 40·3°C.	„ „
1*st December*		„ 40·3°C.	„ 40·3°C.	„ „
2*nd*	„	„ 40·2°C.	„ 40·4°C.	„ „
3*rd*	„	„ 40°C.	„ 40·1°C.	„ „
4*th*	„	„ 40·1°C.	„ 40·3°C.	„ „
5*th*	„	„ 40·6°C.	„ 39·8°C.	„ very „
6*th*	„	„ 40·4°C.	„ 40·6°C.	„ numerous in the blood.
7*th*	„	„ 40·5°C.	„ 40·2°C.	„ „
8*th*	„	„ 40°C.	„ 40·3°C.	„ „
9*th*	„	„ 40·4°C.	„ 40·3°C.	„ „
10*th*	„	„ 40·4°C.	„ 40·3°C.	„ „
11*th*	„	„ 40·6°C.	„ 40·5°C.	„ „
12*th*	„	„ 40·5°C.	„ 40°C.	„ „
13*th*	„	„ 39·5°C.	„ 40·1°C.	„ „
14*th*	„	„ 40·3°C.	„ 40·2°C.	„ „
15*th*	„	„ 40°C.	„ 40·5°C.	„ „

16th	*Dec.*—Temp.	A.M.	40·1°C.	P.M.	40°C.	Hæmatozoa	numerous in the blood.
17th	„	„	40°C.	„	40·3°C.	„	„
18th	„	„	39·5°C.	„	40°C.	„	swarming „
19th	„	„	39·3°C.	„	40·1°C.	„	„
20th	„	„	39·7°C.	„	40·1°C.	„	very numerous in the blood.
21st	„	„	40°C.	„	40·2°C.	„	„
22nd	„	„	40·1°C.	„	40·2°C.	„	swarming „
23rd	„	„	39·9°C.	„	40°C.	„	very numerous in the blood.
24th	„	„	40°C.	„	39·8°C.	„	swarming „
25th	„	„	40·2°C.	„	40°C.	„	„
26th	„	„	39·8°C.	„	40·2°C.	„	„
27th	„	„	40·1°C.	Death 3-30 P.M.			

AUTOPSY made immediately after death.

The animal is well nourished; fat is present under the skin and especially in the abdominal cavity attached to the mesentery and around the organs. There is no fluid present in the pleural cavities, but the pericardial sac contains half a drachm.

Lungs.—Present small circumscribed spots of emphysema; also several round extravasations of blood, red in colour, ½ an inch in diameter on their superior surfaces.

Liver.—Is large and the gall-bladder is distended with clear fluid. The liver presents also several yellow patches depressed in the centre, apparently undergoing caseous change. There are no hæmatozoa in the clear fluid of the gall-bladder.

Spleen.—Weighs 7 Grammes=(105 grains) and is considerably enlarged. *On section,* the tissues are firm and full of blood, the latter contains numerous hæmatozoa.

Kidneys.—The capsules strip off very easily, and no petechiæ are present on the external cortical portion.

Stomach.—Contains little or no food, but within a short distance of the pyloric extremity, there is a patch in the form of the letter V with the angle turned towards the pylorus. The V-shaped clot is brownish-black in colour, whilst the free border is of pinkish-red. When the grumous blood was removed from the surface of the mucous membrane, a loss of substance was observable.

Bladder.—Healthy.

Remarks.—This animal was inoculated with 1 c.c. of blood containing very numerous hæmatozoa, taken from the horse.

The time which elapsed between the inoculation and the first appearance of the organism in the blood, was twelve days.

The hæmatozoon continued to be present in the blood from its first appearance until death—a period of forty-three days.

The chief pathological lesions were, localized emphysema of the lungs and the presence of small extravasations lying under the visceral pleuræ; also a clot of blood lying on the mucous membrane of the stomach close to the pylorus and considerable enlargement of the spleen.

No. II.—GUINEA-PIG.

2nd November 1890.—Inoculated in the Right Inguinal Region with 1 c.c. of blood from Horse No. II.

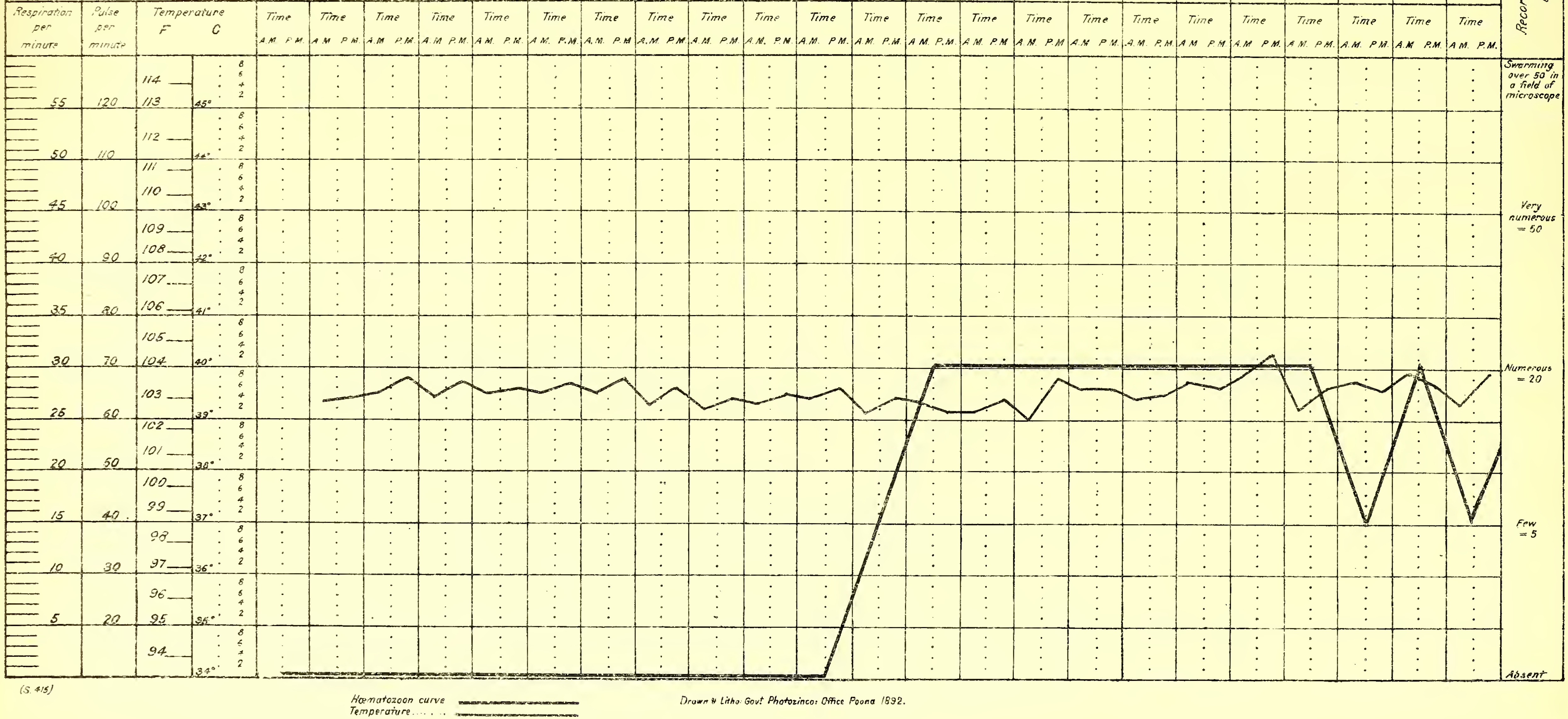
3rd	„	Temp. A.M.	39·3°C.	Temp. P.M.	39·5°C.	No hæmatozoa	in the blood.
4th	„	„	39·4°C.	„	39·8°C.	„	„
5th	„	„	39°C.	„	39·6°C.	„	„
6th	„	„	39·2°C.	„	39·7°C.	„	„
7th	„	„	39·1°C.		39·4°C.	„	„

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Guinea Pig inoculated Subcutaneously with 1·0 cc of blood from Horse No. II. Age Sex Colour

Disease, "Surra". Date of Inoculation, 2. Nov. 90. Result, Death. Date of Result, 27.12.90. Register No. I.

Dates of Observation.	Novr 2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Days of Disease												1	2	3	4	5	6	7	8	9	10	11	12
Organisms in Blood.		—	—	—	—	—	—	—	—	—	—	F	N	N	N	N	N	N	N	N	F	N	F



(S. 415)

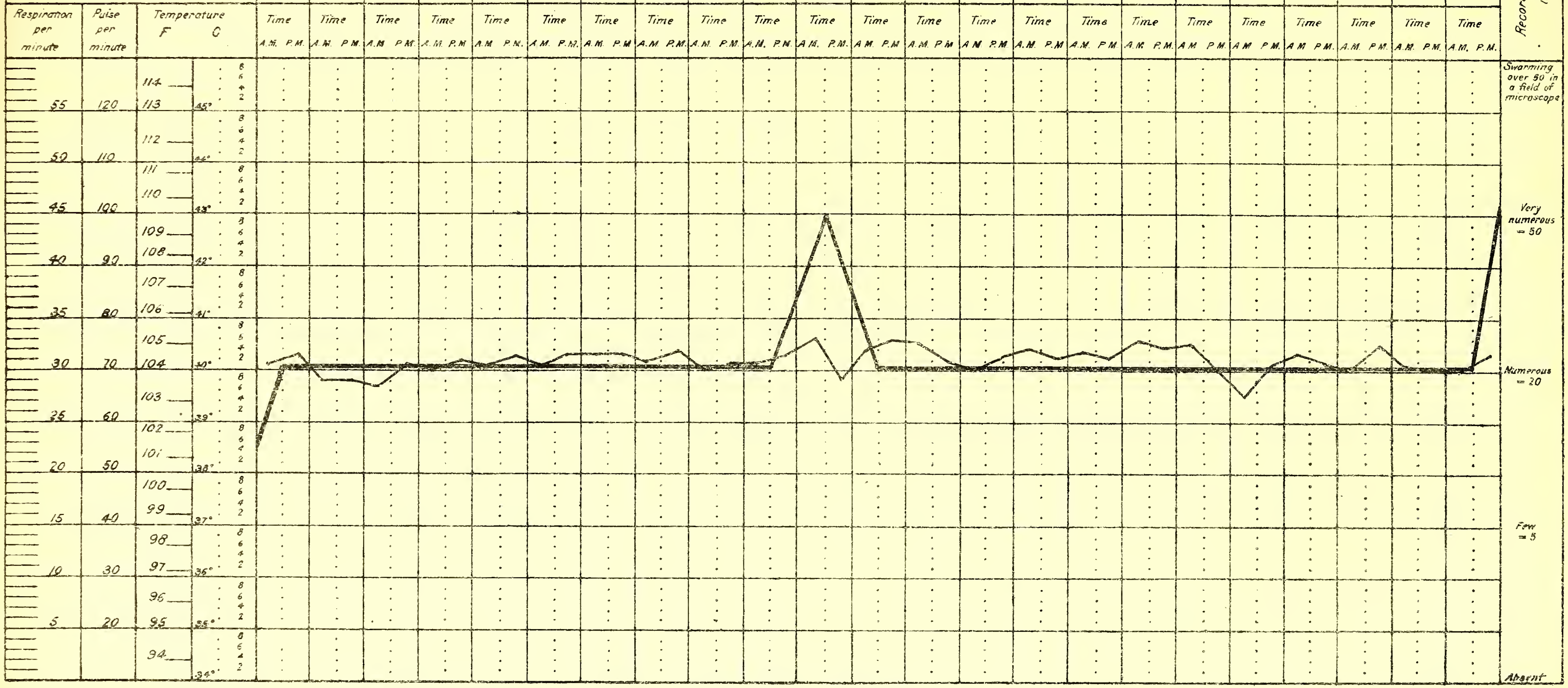
Drawn & Litho: Govt. Photozinco: Office Poona 1892.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Guinea Pig Age Sex Colour

Disease "Surra" Date of Attack Result Date of Result Register No. I.

Dates of Observation.	Nov.r 25	26	27	28	29	30	Dec.r 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Days of Disease	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Organisms in Blood.	N	N	N	N	N	N	N	N	N	N	V.N	N	N	N	N	N	N	N	N	N	N	N	N



(S 415)

Hæmatozoon curve

Temperature ....

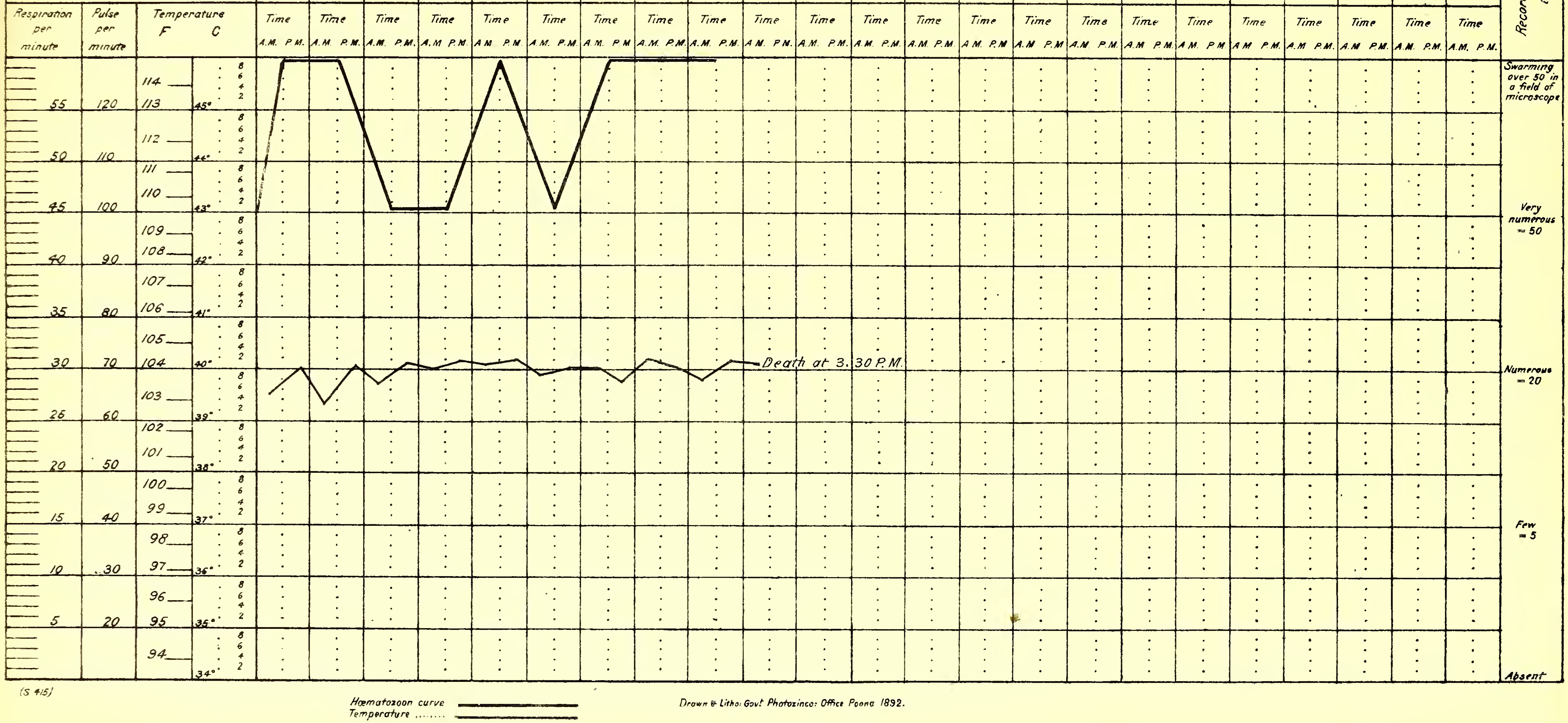
Drawn & Litho Govt. Photozinco: Office Poona 1892.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Guinea Pig ________ Age ________ Sex ________ Colour ________

Disease "Surra" ________ Date of ________ Result ________ Date of Result ________ Register No. I.

Dates of Observation.	Decr 18	19	20	21	22	23	24	25	26	27
Days of Disease	36	37	38	39	40	41	42	43	44	45
Organisms in Blood	S	S	VN	VN	S	VN	S	S	S	



(S 415)

Drawn & Litho: Govt Photozinco: Office Poona 1892.

8th November 1890.—Temp. A.M. 39·4°C. Temp. P.M. 39·5°C. No hæmatozoa in the blood.

9th „ „ 39·4°C. „ 39·7°C. „ „

10th „ „ 39·6°C. „ 39·7°C. „ „

11th „ „ 39·4°C. Temp. P.M. 39·2°C. Two hæmatozoa were observed in the blood.

12th „ „ 39·5°C. Hæmatozoa numerous in the blood. Temp. P.M. 39·7°C.

13th „ Temp. A.M. 39·5°C. Temp. P.M. 39·7°C. Numerous hæmatozoa were observed in the blood. They appear large and active, and make more extensive excursions than those observed in the blood of the horse, which usually remain more or less in the same locality.

14th „ Temp. A.M. 39·3°C. Temp. P.M. 39·1°C. Hæmatozoa numerous in the blood.

15th „ „ 39·2°C. „ 39·8°C. „ „

16th „ „ 39·1°C. „ 39·7°C. „ absent from „

17th „ „ 38·8°C. „ 39·7°C. „ „ „

18th „ „ 39·1°C. „ 39·4°C. „ present in „

19th „ „ 39·1°C. „ 39·7°C. „ numerous but torpid in the blood.

20th „ „ 39·4°C. „ 40°C. „ numerous and active in the blood.

21st „ „ 39·4°C. „ 40°C. „ numerous in the blood.

22nd „ „ 39·7°C. „ 39·8°C. „ very numerous in the blood.

23rd „ „ 39·8°C. „ 39·2°C. „ very numerous and active in the blood.

24th „ „ 39·5°C. „ 39·8°C. „ „ „

25th „ „ 39·8°C. „ 40°C. „ numerous but torpid in the blood.

26th „ „ 39·7°C. „ 39·7°C. „ numerous in the blood.

27th „ „ 40°C. „ 40°C. „ „ „

28th „ „ 39·8°C. „ 40·5°C. „ very „

29th „ „ 40·4°C. „ 40·1°C. „ „ „

30th „ „ 39·7°C. „ 40·1°C. „ numerous „

1st December „ 40·2°C. „ 40·5°C. „ very „

2nd „ „ 40·3°C. „ 40·2°C. „ „ „

3rd „ „ 39·9°C. „ 39·8°C. „ „ „

4th „ „ 40·1°C. „ 40·6°C. „ „ „

5th „ „ 40·7°C. „ 40·2°C. „ swarming „

6th „ „ 40·6°C. „ 40·7°C. „ „

7th „ „ 40·5°C. „ 41°C. „ and very active in the blood.

8th „ „ 40·3°C. „ 40·4°C. „ very numerous „

9th „ „ 40·5°C. „ 40·3°C. „ swarming „

10th „ „ 40·2°C. „ 40·3°C. „ „ „

11th „ „ 40·2°C. „ 40·4°C. „ numerous „

12th „ „ 40·4°C. „ 40·2°C. „ „ „

13th „ „ 39·6°C. „ 40·2°C. „ „ „

14th „ „ 40·2°C. „ 40·2°C. „ swarming in the blood.

15th „ „ 40·1°C. „ 40·6°C. „ very „

16th „ „ 40·3°C. „ 40·1°C. „ „ „

17th „ „ 40·2°C. „ 40·5°C. „ „ „

18th	*December* 1890.—	Temp. A.M.	40·2°C.	Temp. P.M.	40·3° C.	Hæmatozoa	very numerous	in the blood.
19th	"	"	40·1°C.	"	39·9°C.	"	"	"
20th	"	"	40·1°C.	"	40·5°C.	"	"	"
21st	"	"	40·4°C.	"	40·4°C.	"	"	"
22nd	"	"	40·5°C.	"	40·2°C.	"	"	"
23rd	"	"	40·2°C.	"	40·2°C.	"	"	"
24th	"	"	40·4°C.	"	40·4°C.	"	"	"
25th	"	"	40·5°C.	"	40·5°C.	"	"	"
26th	"	"	40·2°C,	"	40·6°C.	"	"	"
27th	"	"	40·5° C.	"	40·2°C.	"	"	"
28th	"	"	40° C.	"	40·5°C.	"	"	"
29th	"	"	40°C.	"	39·6°C.	"	"	"
30th	"	"	39·7°C.	"	39·9°C.	"	numerous	"
31st	"	"	39·6°C.	"	39·9°C.	"	"	"
1st	*January* 1891	"	39·7°C.	"	40·2°C.	"	swarming	"
2nd	"	"	40° C.	"	40·2°C.	"	numerous	"
3rd	"	"	40·1°C.	"	40·1°C.	"	"	"
4th	"	"	39·7°C.	"	40·1°C.	"	few	"
5th	"	"	39·8°C.	"	40·2°C.	"		"
6th	"	"	40·4°C.	"	39·8°C.	"	absent from	"
7th	"	"	40°C.	"	40·3°C.	"	few in	"
8th	"	"	40·5°C.	"	40·7°C.	"	numerous	"
9th	"	"	40·6°C.	"	40·7°C.	"	"	"
10th	"	"	40·5°C.	"	40·6°C.	"	absent from	"
11th	"	"	40·5°C.	"	40·5°C.	"	"	"
12th	"	"	40·2°C.	"	40·4°C.	"	"	"
13th	"	"	39·8°C.	"	40·2°C.	"	"	"
14th	"	"	39·7°C.	"	40·1°C.	"	few in	"
15th	"	"	39·7°C,	"	40·1°C.	"	"	"
16th	"	"	40·6°C.	"	40·5°C.	"	numerous	"
17th	"	"	40°C.	"	40·4°C.	"	"	"
18th	"	"	40·5°C.	"	40·6°C.	"	few	"
19th	"	"	40·7°C.	"	40·8°C.	"		"
20th	"	"	40·2°C.	"	40·3°C.	"	absent from	"
21st	"	"	40·1°C.	"	40·3°C.	"	few in	"
22nd	"	"	40·3°C.	"	40·6°C.	"	very numerous	"
23rd	"	"	40·4°C.	"	40·3°C.	"	numerous	"
24th	"	"	40·2°C.	"	40·1°C.	"	"	"
25th	"	"	40·1°C.	"	40·2°C.	"	"	"
26th	"	"	40·1°C.	"	40·7°C.	"	"	"
27th	"	"	40·2°C.	"	40·6°C.	"	few	"
28th	"	"	40·2°C.	"	40°C.	"		"
29th	"	"	40·5°C.	"	40·9°C.	"		"
30th	"	"	40·4°C.	"	40·6°C.	"		"
31st	"	"	40·3°C.	"	40·5°C.	"		"
1st	*February*	"	40·2°C.	"	40·2°C.	"		"
2nd	"	"	39·8°C.	"	39·7°C.	"		"
3rd	"	"	41°C.	"	40·7°C.	"	absent from	"
4th	"	"	39·8°C.	"	38·7°C.	"	few in	"
5th	"	"	38·5°C.	"	39°C.	"	absent from	"
6th	"	"	37·1°C.	"	37·3°C.	"	numerous	"
7th	"	Death occurred early in the morning.						

AUTOPSY.—There is emphysema of the lungs, and the spleen is very small.

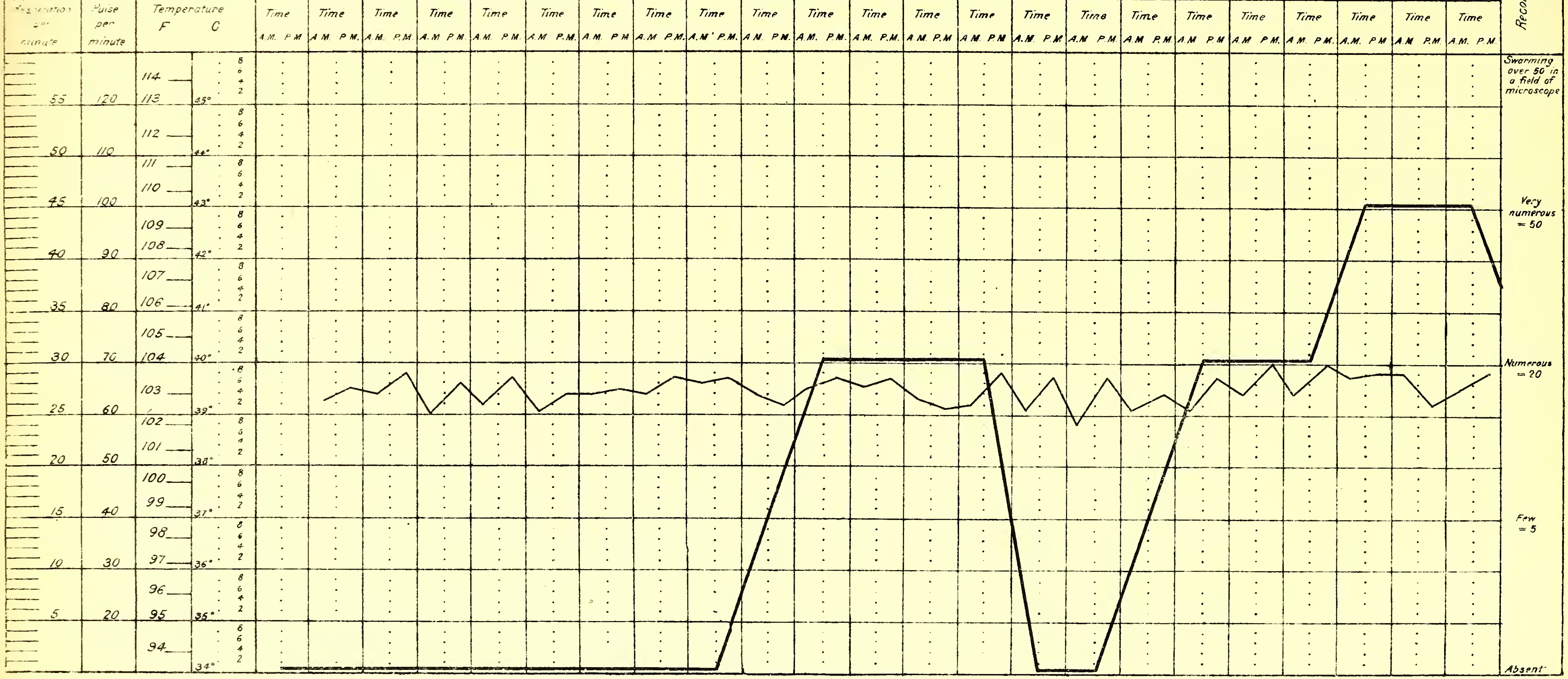
Remarks.—This animal was inoculated with 1 c.c. of blood, containing very numerous hæmatozoa taken from the horse.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Guinea Pig inoculated subcutaneously with 1·0 cc of blood from Horse No. 11 ______ Age ______ Sex ______ Colour ______

Disease "Surra" ______ Date of Inoculation 2 Nov: 1890 ______ Result Death ______ Date of Result 7. 2. 91 ______ Register No. 11 ______

Dates of Observation	Novr 2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Days of Disease										1	2	3	4	5	6	7	8	9	10	11	12	13	14
Organisms in Blood		—	—	—	—	—	—	—	—	F	N	N	N	N	—	—	F	N	N	N	VN	VN	VN



(S 415)

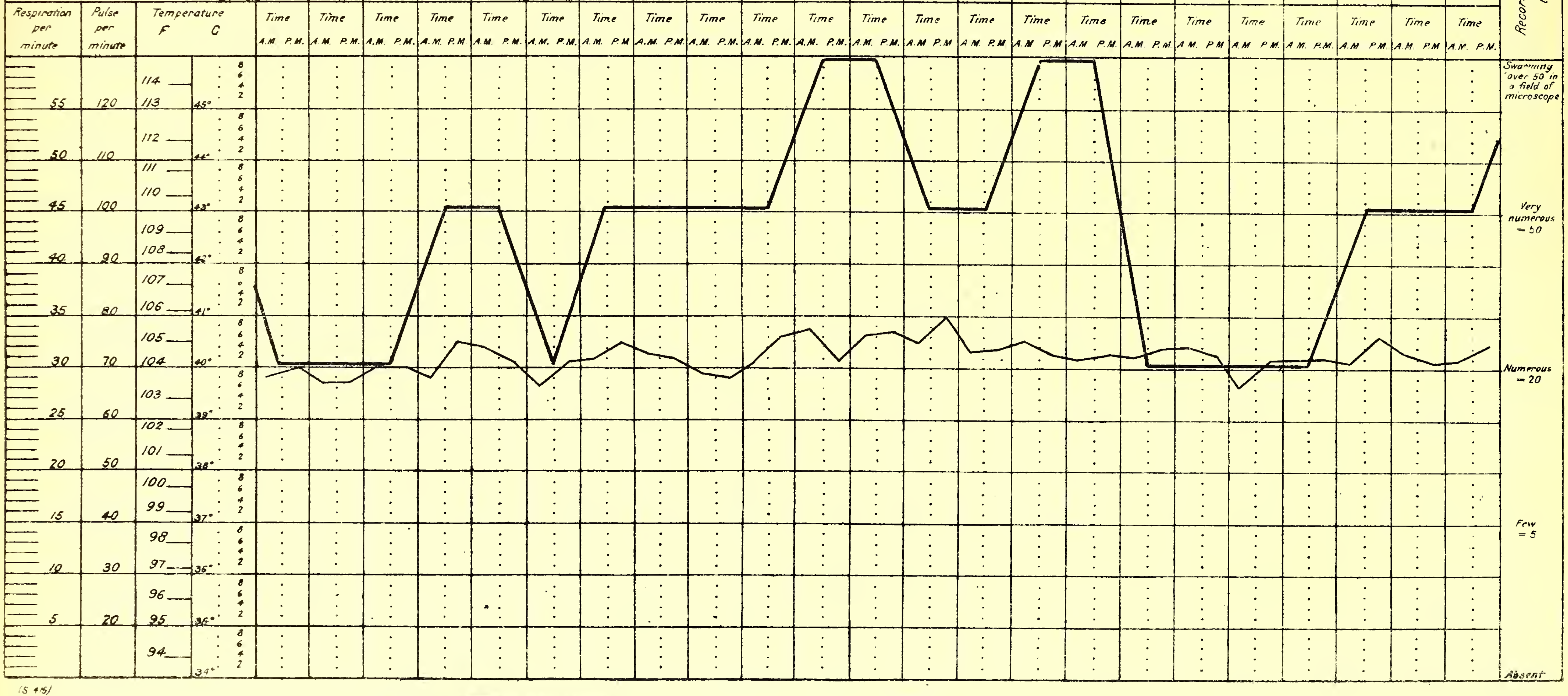
Hæmatozoon curve
Temperature ......

Drawn & Litho: Govt Photozinco: Office Poona 1893

Age ______ Sex ______ Colour ______

Disease ______ Date of ______ Result ______ Date of Result ______ Register No. ______

Dates of Observation.	Nov.r 25	26	27	28	29	30	Dec.r 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Days of Disease	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37
Organisms in Blood.	N	N	N	VN	VN	N	VN	VN	VN	VN	S	S	VN	VN	S	S	N	N	N	N	VN	VN	VN



(S 45)

Hæmatozoon curve
Temperature

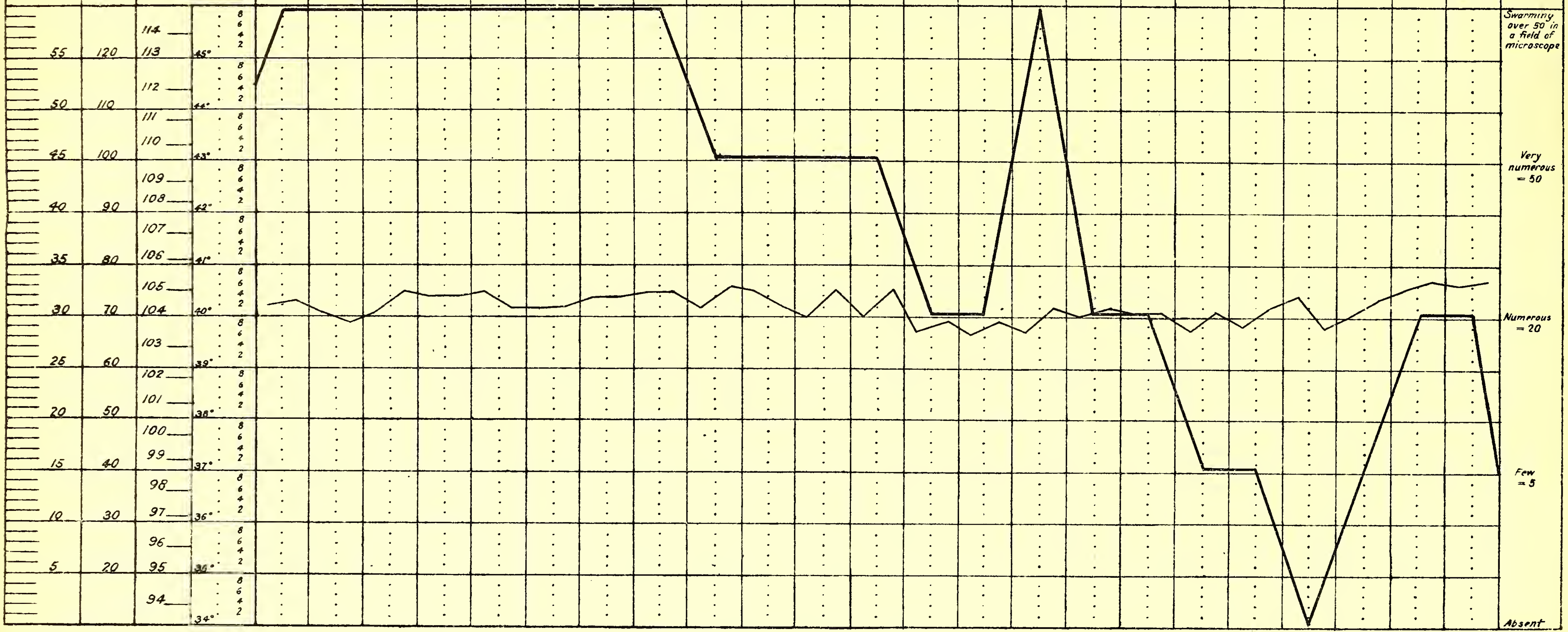
Drawn & Litho: Gov.t Photozinco: Office Poona 1893.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age ____ Sex ____ Colour ____

Disease ____ Date of ____ Result ____ Date of Result ____ Register No. ____

Dates of Observation.	Dec.r 18	19	20	21	22	23	24	25	26	27	28	29	30	31	Jan.y 1	2	3	4	5	6	7	8	9	Record of Organisms in Blood.
Days of Disease	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	
Organisms in Blood.	S	S	S	S	S	S	S	S	VN	VN	VN	VN	N	N	S	N	N	F	F	—	F	N	N	
Respiration per minute / Pulse per minute / Temperature F C	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. F.M.	Time A.M. P.M.	



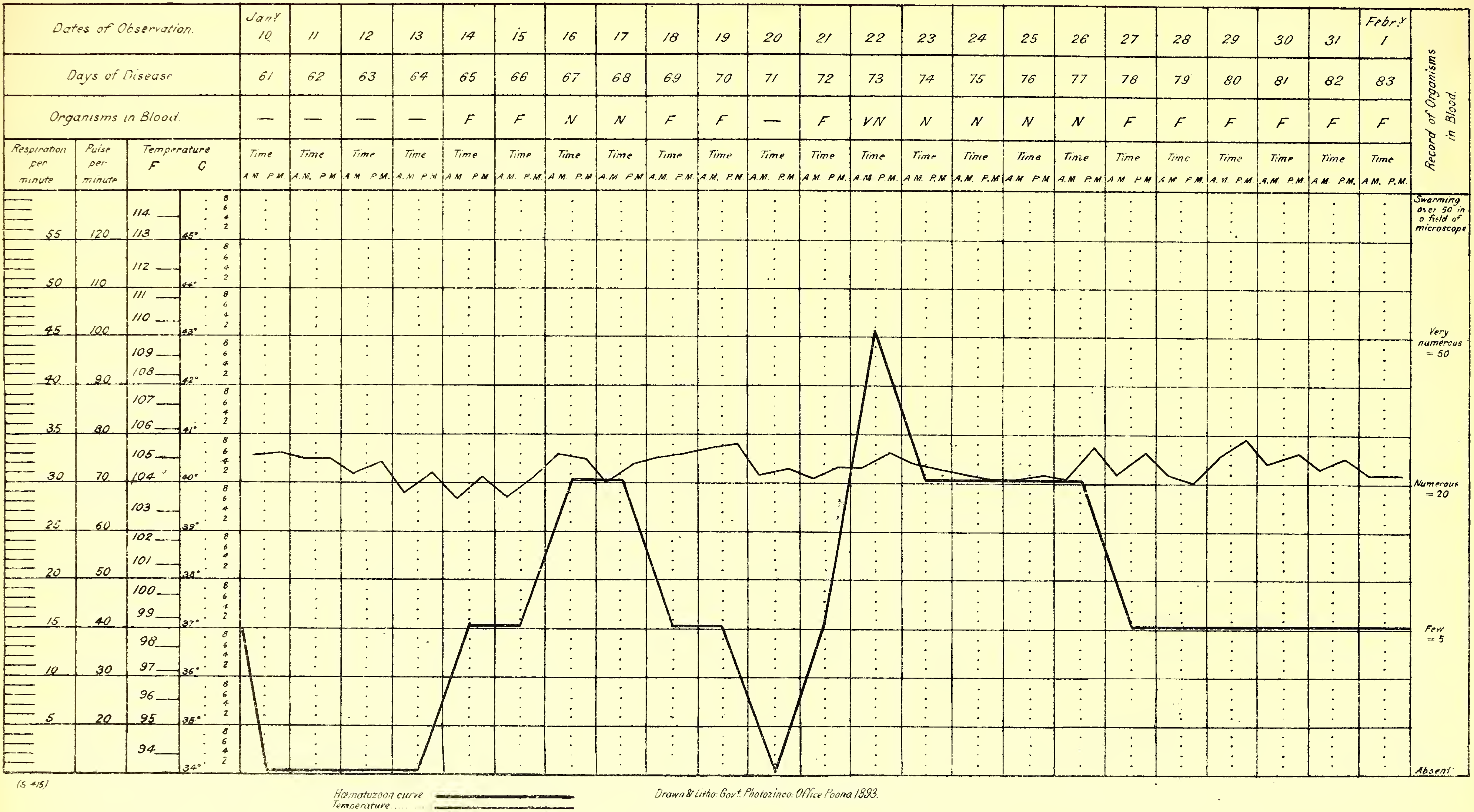
(S 415)

Drawn & Litho Gov.t Photozinco: Office Poona 1893.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age Sex Colour

Disease Date of Result Date of Result Register No.



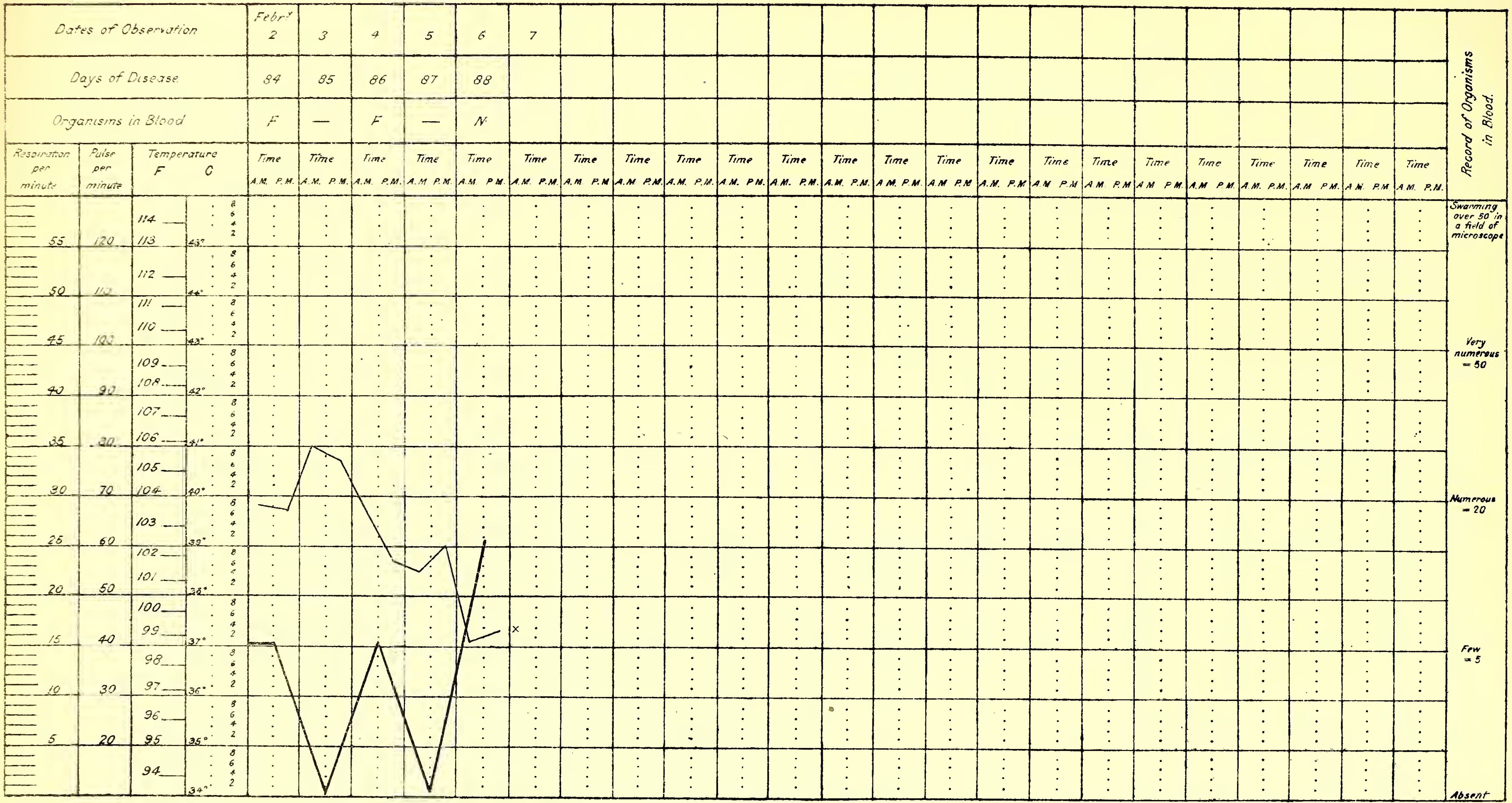
(S 415)

Drawn & Litho: Gov.t Photozinco. Office Poona 1893.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age ____ Sex ____ Colour ____

Disease ____ Date of ____ Result ____ Date of Result ____ Register No. ____



Dates of Observation	Febr.y 2	3	4	5	6	7
Days of Disease	84	85	86	87	88	
Organisms in Blood	F	—	F	—	N	

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Hæmatozoon curve ——
Temperature...... .. ——

Drawn & Litho: Gov.t Photozinco: Office Poona 1893.

× Death early in the morning on the 7th

The time which elapsed from the inoculation of the animal until the first appearance of the organism in the blood, occupied nine days.

The organism continued to be present off and on during a period of eighty-eight days, the time which elapsed from the inoculation until death, being ninety-seven.

The only pathological lesion found at the *Post-mortem* was emphysema of the lungs, the spleen was small.

No. III.—GUINEA-PIG (*Pregnant doe*).

24th November 1890.—12-45 P.M.—Inoculated subcutaneously in the Right Inguinal Region with ·5c. c. of blood taken from Horse No. IV. Temp. A.M. 40·1°C., P.M. 40·3°C. Blood healthy.

25th „ Temp. A.M. 40·3°C. P.M. 40.°C. No hæmatozoa in the blood.

26th „ „ 39·6°C. „ 40·2°C. „ „

27th „ „ 39·2°C. „ 40·6°C. „ „

28th „ „ 39·7°C. „ 40·3°C. „ „

29th „ „ 39·5°C. „ 40·5°C. „ „

30th „ „ 39·9°C. „ 40·7°C. „ „

Three young ones were born at noon. One born dead. No hæmatozoa in its blood. Also no hæmatozoa in the blood of Nos. I and II young ones.

1st December.—Temp. A.M. 40·9°C., P.M. 41·1°C. Few hæmatozoa in the blood of the mother. No hæmatozoa in the blood of young ones—Nos. I and II.

2nd „ Temp. A.M. 40·7°C. P.M. 40·7°C. Few hæmatozoa in the mother's blood. None in that of Nos. I and II.

3rd „ „ 40·1°C. „ 40·6°C. „ „

4th „ „ 40·5°C. „ 40·9°C No. hæmatozoa in the mother's blood. None in that of Nos. I and II.

5th „ „ 40·8°C. „ 40·9°C. „ „

6th „ „ 40·8°C. „ 41·1°C. „ „

7th „ „ 40·8°C. „ 40·9°C. Few hæmatozoa in the mother's blood. None in that of Nos. I and II.

8th „ „ 40·4°C. „ 40·8°C. „ „

9th „ „ 40·4°C. „ 40·3°C. „ „

10th „ „ 40·5°C. „ 40·6°C. Hæmatozoa numerous in the mother's blood. None in that of Nos. I and II.

11th „ „ 40·6°C. „ 40·7°C. „ „

12th „ „ 40·7°C. „ 40·5°C. „ „

13th „ „ 40·2°C. „ 40·4°C. „ „

14th „ „ 40·2°C. „ 40·5°C. Hæmatozoa numerous in the blood, but none in the milk of the mother. Hæmatozoa absent from the blood of the young ones Nos. I and II.

15th „ Temp. A.M. 39·9°C. P.M. 40·3°C. Hæmatozoa numerous in the mother's blood, but none in that of Nos. I and II.

16th „ Temp. A.M. 40·4°C. P.M. 40·6°C. Hæmatozoa numerous in the mother's blood, *few in that of* No. I, and none in that of No. II.

17th „ Temp. A.M. 40·3°C. P.M. 40·7°C. Hæmatozoa numerous in the mother's blood. None in that of Nos. I and II.

18th „ Temp. 40·3°C. P.M. 40·5°C. Hæmatozoa numerous in the mother's blood. None in that of Nos. I and II.

19th „ Temp. A.M. 40·1°C. P.M. 40·5°C. Hæmatozoa absent from the mother's blood and that of Nos. I and II.

20th „ Temp. A.M. 40·5°C. P.M. 40·4°C. Hæmatozoa few in the mother's blood. None in that of Nos. I and II.

21st „ Temp. A.M. 40·6°C. P.M. 40·7°C. Hæmatozoa numerous in the mother's blood. None in that of Nos. I and II.

22nd „ Temp. A.M. 40·7°C. P.M.. 40·7°C. Hæmatozoa numerous in the mother's blood. None in that of Nos. I and II.

23rd „ Temp. A.M. 40·4°C. P.M. 40·8°C. Hæmatozoa numerous in the mother's blood. None in that of Nos. I and II.

24th December.—Temp. A.M. 40·6°C. P.M. 40·5°C. Hæmatozoa numerous in the mother's blood. None in that of Nos. I and II.

25th " Temp. A.M. 40·4°C. P.M. 40·2°C. Hæmatozoa numerous in the mother's blood. None in that of Nos. I and II.

26th " Temp. A.M. 40·2°C. P.M. 40·7°C. Hæmatozoa numerous in the mother's blood. None in that of Nos. I and II.

27th " Temp. A.M. 40·8°C. P.M. 40·5°C. Hæmatozoa numerous in the mother's blood. None in that of Nos. I and II.

28th " Temp. A.M. 40·2°C. P.M. 40·5°C. Hæmatozoa numerous in the mother's blood. None in that of Nos. I and II.

29th " Temp. A.M. 40·2°C. P.M. 40·1°C. Hæmatozoa numerous in the mother's blood. None in that of Nos. I and II.

30th " Temp. A.M. 38·8°C. P.M. 40·1°C. Hæmatozoa numerous in the mother's blood. None in that of Nos. I and II.

31st " Temp. A.M. 39·8°C. P.M. 40·1°C. Hæmatozoa numerous in the mother's blood. None in that of Nos. I and II.

1st Jan. 1891.—Temp. A.M. 40·1°C. P.M. 40·5°C. Hæmatozoa numerous in the mother's blood. None in that of Nos. I and II.

2nd " Temp. A.M. 39·6°C. P.M. 40·3°C. Hæmatozoa numerous in the mother's blood. None in that of Nos. I and II.

3rd " Temp. A.M. 40·2°C. P.M. 39·9°C. Hæmatozoa numerous in the mother's blood. From this date, the young ones are to be kept in a separate cage, away from the mother.

4th	"	Temp. A.M.	39·9°C.	P.M.	40·2°C.	Hæmatozoa	absent from	the blood.
5th	"	"	39·9°C.	"	40·4°C.	"	"	"
6th	"	"	40·1°C.	"	40°C.	"	"	"
7th	"	"	40·3°C.	"	40·3°C.	"	"	"
8th	"	"	40·3°C.	"	40·1°C.	"	numerous in	the blood.
9th	"	"	40·4°C.	"	40·5°C.	"	"	"
10th	"	"	40·3°C.	"	40·5°C.	"	"	"
11th	"	"	40·3°C.	"	40·5°C.	"	few in	"
12th	"	"	40·2°C.	"	40·4°C.	"	"	"
13th	"	"	39·6°C.	"	40·1°C.	"	numerous in	"
14th	"	"	39·3°C.	"	40°C.	"	"	"
15th	"	"	39·7°C.	"	40·2°C.	"	very "	"
16th	"	"	39·7°C.	"	40·4°C.	"	numerous in	"
17th	"	"	40·4°C.	"	40·5°C.	"	"	"
18th	"	"	40·1°C.	"	40·2°C.	"	"	"
19th	"	"	39·4°C.	"	40·6°C.	"	"	"
20th	"	"	40°C.	"	39·6°C.	"	swarming	"
21st	"	"	40°C.	"	40·2°C.	"	"	"
22nd	"	"	39·6°C.	"	40·3°C.	"	"	"
23rd	"	"	40°C.	"	40·2°C.	"	"	"
24th	"	"	40·1°C.	"	40·°C.	"	very numerous	"
25th	"	"	39·8°C.	"	40·3°C.	"	"	"
26th	"	"	40·3°C.	"	40·5°C.	"	"	"
27th	"	"	39·5°C.	"	40·5°C.	"	swarming	"
28th	"	"	40·3°C.	"	40·1°C.	"	very numerous	"
29th	"	"	40·3°C.	"	40·5°C.	"	swarming	"
30th	"	"	40·2°C.	"	40·7°C.	"	"	"
31st	"	"	40·1°C.	"	40·6°C.	"	very numerous	"
1st	*February*	"	40·4°C.	"	40.3°C.	"	few	"
2nd	"	"	40·1°C.	"	40·1°C.	"	absent from	"
3rd	"	"	40·1°C.	"	40·1°C.	"	"	"
4th	"	"	40°C.	"	40·3°C.	"	few in	the blood of the

mother. Hæmatozoa have been absent from the blood of young ones Nos. I and II from the 3rd of January, the date of their removal to a separate cage, up to this date, when they were inoculated subcutaneously in the Right Inguinal Region with ·2c. c. of blood from the Jugular Vein of Horse No. XI.

5th	February.—	Temp. A.M. 39·9°C.	Temp. P.M. 40·4C.	Hæmatozoa numerous in the blood of the mother.
6th	„	Temp. A.M. 40·5°C.	P.M. 40·5°C.	Hæmatozoa numerous in the blood.
7th	„	„ 40·7°C.	„ 40·7°C.	„ „ „
8th	„	„ 40·5°C.	„ 40·6°C.	„ few in the blood.
9th	„	„ 39·7°C.	„ 40·5°C.	„ „ „
10th	„	„ 40°C.	„ 40·6°C.	„ numerous „
11th	„	„ 40·4°C.	„ 40·7°C.	„ „ „
12th	„	„ 40·4°C.	„ 40·6°C.	Hæmatozoa few in the blood.
13th	„	„ 40·4°C.	„ 40·6°C.	„ absent from „
14th	„	„ 40·8°C.	„ 40·7°C.	„ „ „
15th	„	„ 40·3°C.	„ 40·5°C.	„ „ „
16th	„	„ 40·2°C.	„ 40·4°C.	„ „ „
17th	„	„ 40·3°C.	„ 40·2°C.	„ „ „
18th	„	„ 40·1°C.	„ 40·3°C.	„ „ „
19th	„	„ 40·2°C.	„ 40·4°C.	„ „ „
20th	„	„ 40·6°C.	„ 40·7°C.	„ „ „
21st	„	„ 40·4°C.	„ 40·6°C.	„ few in the blood.
22nd	„	„ 40·1°C.	„ 40·3°C.	„ numerous in „
23rd	„	„ 40·1°C.	„ 40·3°C.	„ absent from „
28th	„	„ 39·7°C.	„ 40·7°C.	„ few in „
25th	„	„ 40°C.	„ 40·3°C.	„ „ „
26th	„	„ 40·5°C.	„ 40·4°C.	„ „ „
27th	„	„ 40°C.	Temp. P.M. 39·7°C.	Hæmatozoa few in the blood.
28th	„	„ 39·4°C.	Temp. P.M. 37·2°C.	Hæmatozoa few in the blood.

1st *March.*—Death.

AUTOPSY.—Body extremely emaciated.

Lungs are very large, occupying the whole of the pleural cavities, and, on opening the chest-wall, at once bulge out through the opening. The apices are the seat of well marked emphysema; whilst the other parts do not show the change so distinctly. The middle lobe on the right side is of a dark-red colour and consolidated.

Heart is distended with dark-coloured clots; but there are no petechiæ in its cavities.

Liver.—Large. *On section*, appears healthy.

Spleen is enlarged to three times the normal size; but there are no petechiæ on the capsule. *On section*, the tissue is firm and looks healthy.

Stomach.—There is some congestion near the pyloric extremity, but no ulceration.

Kidneys.—There are a few petechiæ on the surface of the organs; but *on section*, they are not found to involve the structures below.

Bladder.—Healthy.

Remarks.—This animal, when inoculated on November 24th, 1890, with blood containing numerous hæmatozoa, was eight weeks advanced in pregnancy. On the 30th or 6 days later, she had three young ones, one born dead. The blood of the mother and that of the young ones was free from hæmatozoa. On December 1st, the mother's blood contained hæmatozoa and continued to do so off and on until her death on March 1st, 1891. The young ones were kept with their mother and were suckled by her for 67 days subsequent to their birth. On the 16th December, No. I young one presented a few hæmatozoa in its blood, but on this day only. On February 4th, it was decided to test whether any protection had been acquired *in utero*, or at a later date during the period of suckling. Consequently the young ones were subcutaneously inoculated in the Inguinal Region with ·2 c. c. of blood, containing numerous hæmatozoa taken from Horse No. XI.

No. I presented hæmatozoa in the blood on the 10th February 1891, and these continued to be present with only 6 days intermission until June 2nd, the date of death, during a period of 113 days.

No. II presented hæmatozoa in the blood on the 10th February 1891, and these continued to be present, with 28 days intermission, until July 3rd, 1891, the date of death, during a period of 144 days.

The points of interest in these cases are :—

(i). That hæmatozoa should have been present for a period of one day only in the general circulation of the young Guinea-pig No. I, and the probability is that they gained an entrance into the stomach of the young animal, and thence got into the circulation through the suckled milk.

(ii). That when the hæmatozoon had once appeared in the blood, viz., on December 16th, 1890, it should not have continued to increase in numbers, and the disease run the usual course.

(iii). That at a later period, after inoculation with horse's blood containing the hæmatozoon, the organism should appear in the blood, after a period of incubation lasting six days, and be observed microscopically on 107 out of the 113 days during which the animal survived.

NO. I.—YOUNG GUINEA-PIG, 67 *days old* (*mother No. III. Guinea-Pig*).

Inoculated subcutaneously in the inguinal region with ·2 c. c. of blood containing numerous hæmatozoa, taken from horse No. XI.

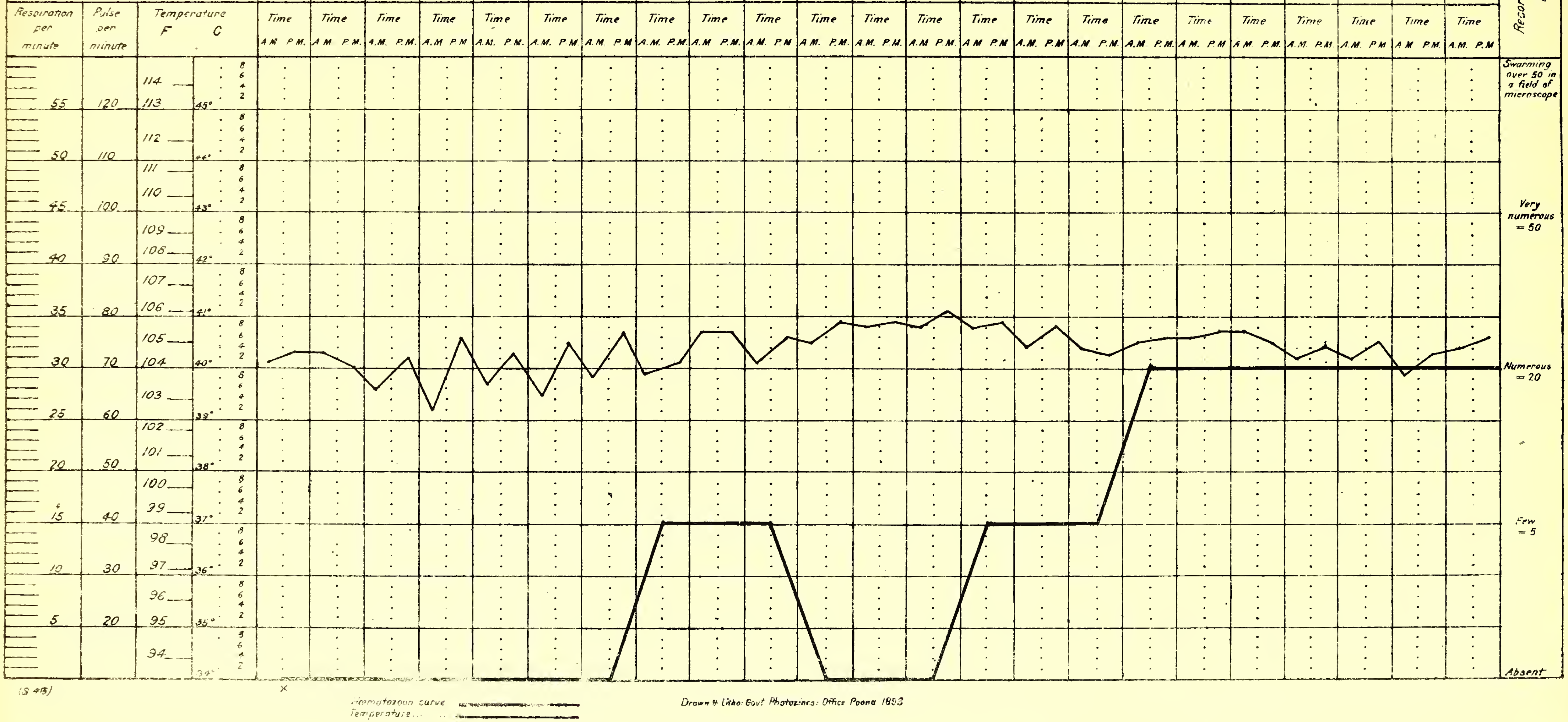
4*th*	*Feb.*	1891.—Temp.	A.M. ——	P.M. 39·5°C.	Hæmatozoa	absent from	the blood.
5*th*	"	"	39·2°C.	" 39·6°C.	"	"	"
6*th*	"	"	38·8°C.	" 38·9°C.	"	"	"
7*th*	"	"	39·5°C.	" 39·6°C.	"	"	"
8*th*	"	"	39·5°C.	" 39·5°C.	"	"	"
9*th*	"	"	39°C.	" 39·6°C.	"	"	"
10*th*	"	"	40·2°C.	" 40°C.	"	numerous in	"
11*th*	"	"	40·1°C.	" 40·8°C.	"	"	"
12*th*	"	"	40·1°C.	" 40°C.	"	"	"
13*th*	"	"	40·2°C.	" 40·4°C.	"	"	"
14*th*	"	"	40·2°C.	" 40°C.	"	"	"
15*th*	"	"	39·8°C.	" 39·9°C.	"	very numerous	"
16*th*	"	"	39·8°C.	" 39·9°C.	"	"	"
17*th*	"	"	39·5°C.	" 39·7°C.	"	"	"
18*th*	"	"	39·5°C.	" 39·7°C.	"	"	"
19*th*	"	"	39·5°C.	" 39·6°C.	"	"	"
20*th*	"	"	39·7°C.	" 38·9°C.	"	"	"
21*st*	"	"	38·5°C.	" 38·7°C.	"	few in	"
22*nd*	"	"	38·4°C.	" 38·5°C.	"	absent from	"
23*rd*	"	"	38·2°C.	" 38·6°C.	"	few in	"
24*th*	"	"	39·9°C.	" 39·8°C.	"	numerous in	"
25*th*	"	"	39·7°C.	" 39·9°C.	"	very numerous	"
26*th*	"	"	39·6°C.	" 39·7°C.	"	"	"
27*th*	"	"	39·7°C.	" 40·7°C.	"	"	"
28*th*	"	"	40·3°C.	" 40·5°C.	"	"	"
1*st*	*March*	"	39·3°C.	" 39·6°C.	"	"	"
2*nd*	"	"	39·4°C.	" 39·6°C.	"	"	"
3*rd*	"	"	39·7°C.	" 39·9°C.	"	swarming	"
4*th*	"	"	39·5°C.	" 39·8°C.	"	"	"
5*th*	"	"	39·5°C.	" 39·7°C.	"	very numerous	"
6*th*	"	"	39·5°C.	" 39·5°C.	"	"	"
7*th*	"	"	39·4°C.	" 39·6°C.	"	"	"
8*th*	"	"	39·3°C.	" 39·8°C.	"	numerous	"
9*th*	"	"	39·2°C.	" 39·5°C.	"	"	"
10*th*	"	"	40·2°C.	" 40·4°C.	"	"	"
11*th*	"	"	40°C.	" 40·3°C.	"	"	"
12*th*	"	"	40·1°C.	" 40·3°C.	"	"	"
13*th*	"	"	40·3°C.	" 40·5°C.	"	"	"
14*th*	"	"	40·3°C.	" 40·5°C.	"	"	"
15*th*	"	"	39·4°C.	" 39·5°C.	"	"	"
16*th*	"	"	39·4°C.	" 39·4°C.	"	very numerous	"
17*th*	"	"	39·8°C.	" 39·7°C.	"	"	"
18*th*	"	"	40·1°C.	" 40·3°C.	"	swarming	"
19*th*	"	"	40·7°C.	" 40·6°C.	"	"	"
20*th*	"	"	39·5°C.	" 39·7°C.	"	"	

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Pregnant Doe Guinea Pig, Subcutaneously inoculated with blood 0·5 cc from Horse Nº IV. Age Sex Colour

Disease, 'Surra' Date of Inoculation, 24. 11. 90 Result, Death Date of Result, 1. 3. 91 Register No. III

Dates of Observation	Nov. 24	25	26	27	28	29	30	Dec. 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Days of Disease								1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Organisms in Blood		—	—	—	—	—	—	F	F	F	—	—	—	F	F	F	N	N	N	N	N	N	N



(S 4B)

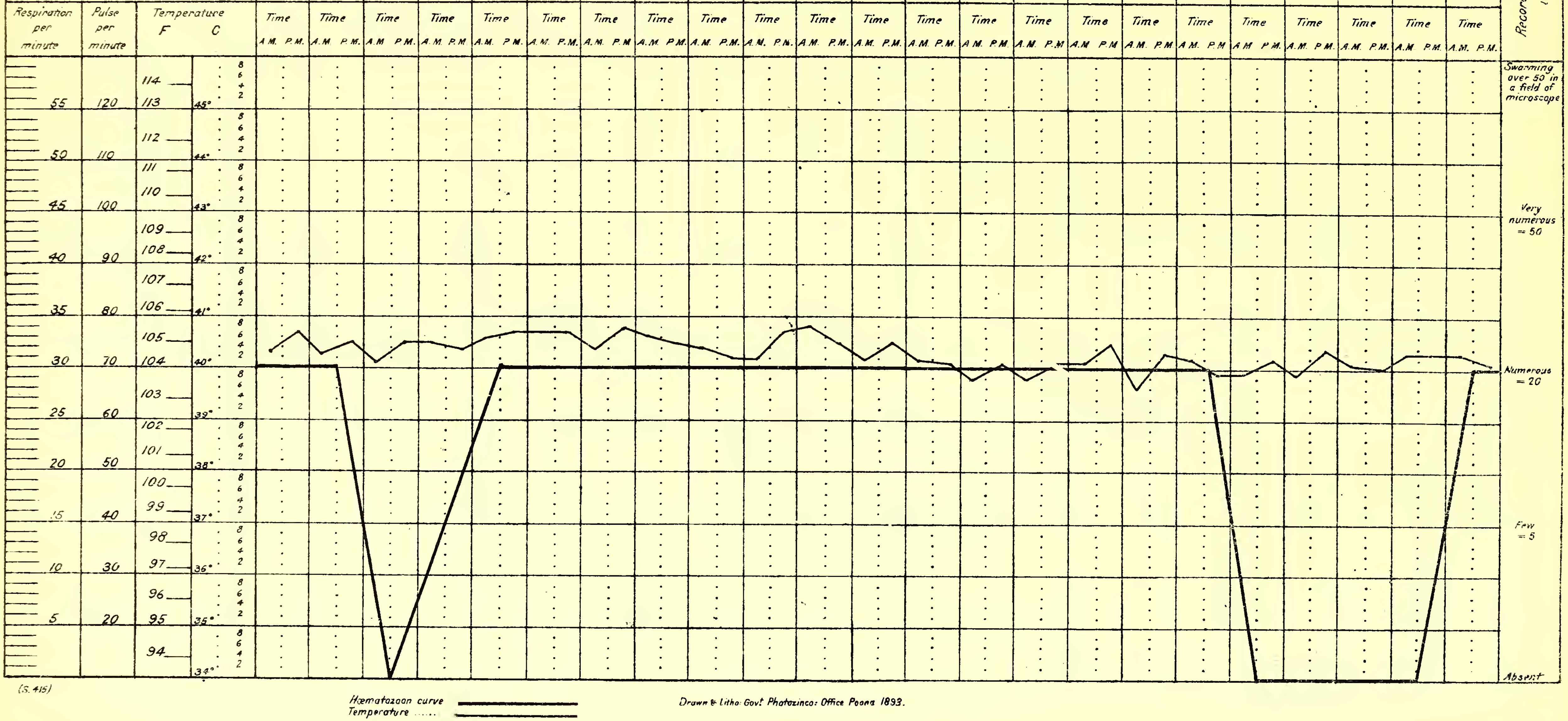
Drawn & Litho: Govt Photozinco: Office Poona 1893

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age ______ Sex ______ Colour ______

Disease ______ Date of ______ Result ______ Date of Result ______ Register No. ______

Dates of Observation.	Dec. 17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Jan. 1	2	3	4	5	6	7	8
Days of Disease	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39
Organisms in Blood.	N	N	—	F	N	N	N	N	N	N	N	N	N	N	N	N	N	N	—	—	—	—	N



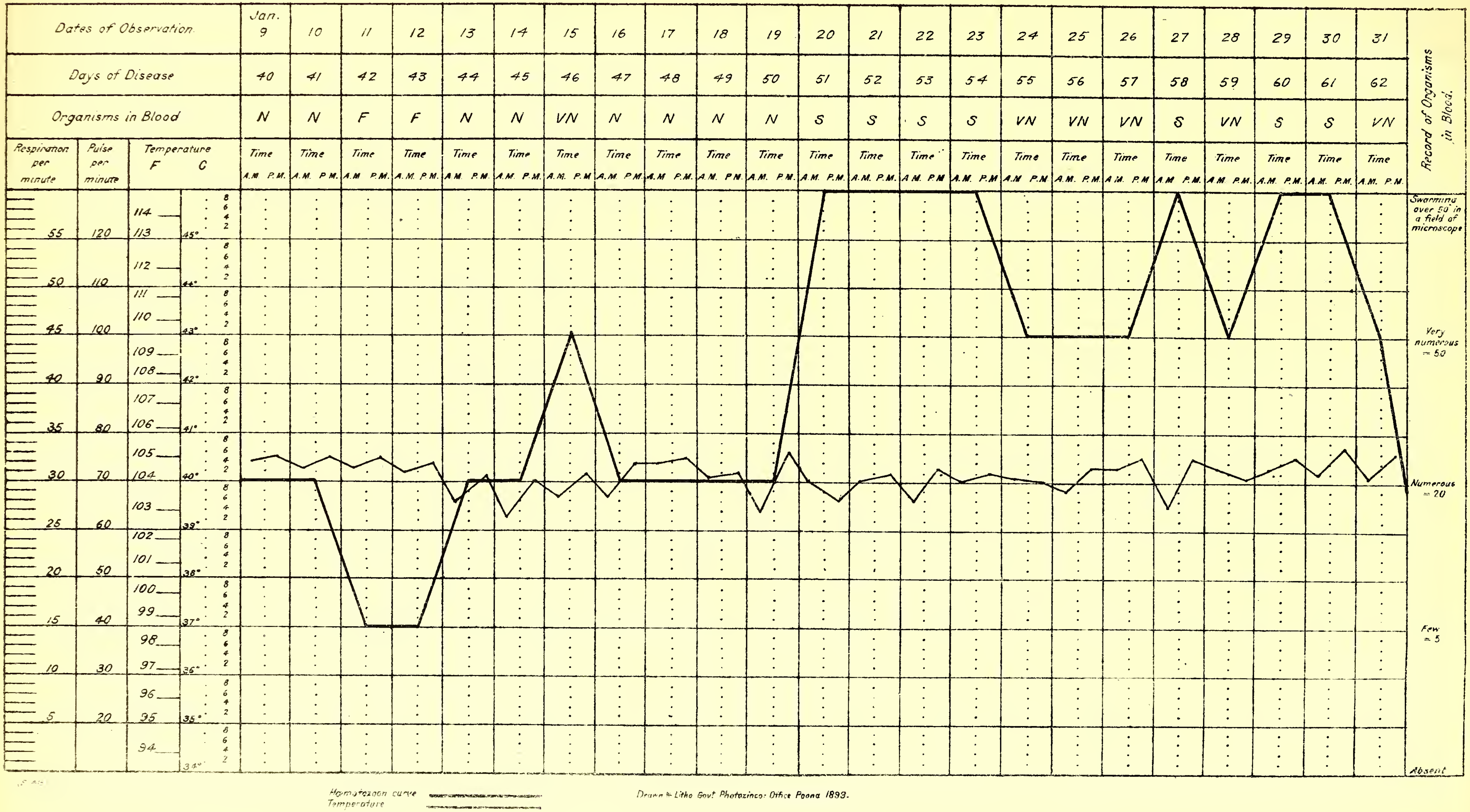
(S. 415)

Drawn & Litho: Govt. Photozinco: Office Poona 1893.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age ______ Sex ______ Colour ______

Disease ______ Date of ______ Result ______ Date of Result ______ Register No. ______



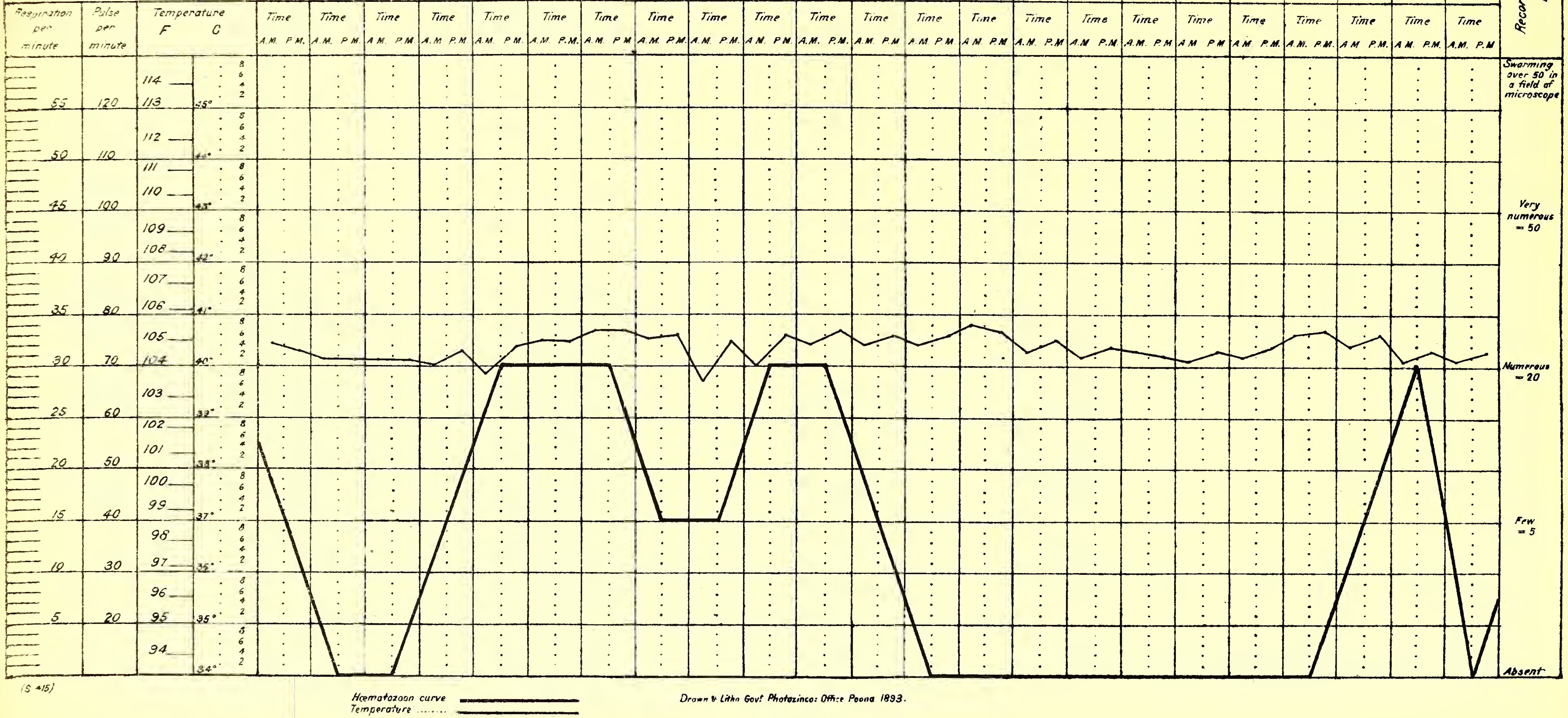
Drawn & Litho Govt. Photozinco: Office Poona 1893.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age ______ Sex ______ Colour ______

Disease ______ Date of ______ Result ______ Date of Result ______ Register No. ______

Dates of Observation.	Feb. 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Days of Disease	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85
Organisms in Blood	F	—	—	F	N	N	N	F	F	N	N	F	—	—	—	—	—	—	—	—	F	N	—



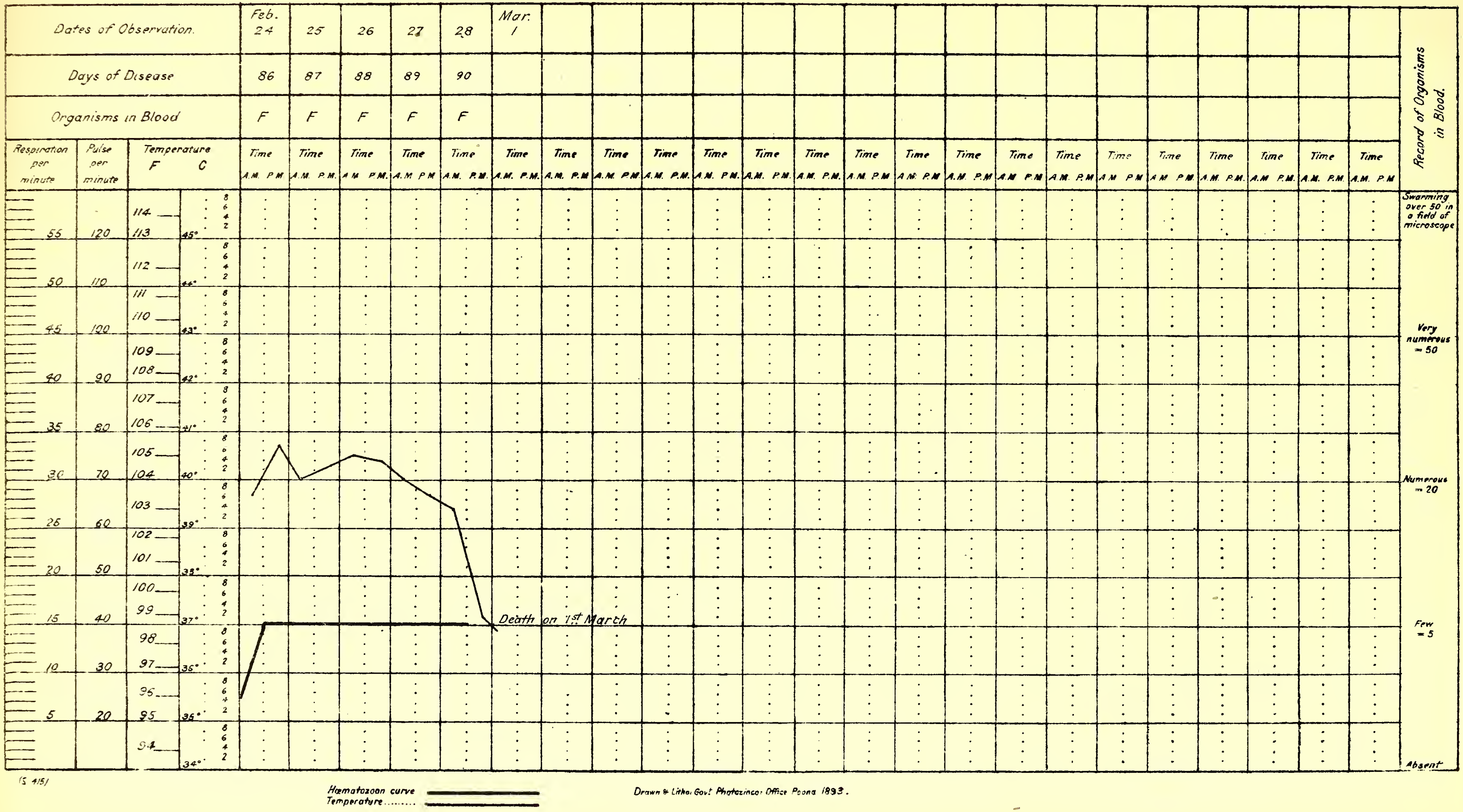
(S 415)

Drawn & Litho Gov! Photozinco: Office Poona 1893.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

________ Age ________ •Sex ________ Colour ________

Disease ________ Date of ________ Result ________ Date of Result ________ Register No. ________



(S 415)

Drawn & Litho: Govt Photozinco: Office Poona 1893.

21st	*March.*—	Temp. A.M.	39·7°C.	P.M.	39·8°C.	Hæmatozoa	very numerous	in the blood.
22nd	„	„	39·5°C.	„	39·8°C.	„	very numerous	„
23rd	„	„	39·8°C.	„	39·9°C.	„	swarming	„
24th	„	„	39·4°C.	„	39·9°C.	„	„	„
25th	„	„	39·5°C.	„	39·9°C.	„	„	„
26th	„	„	39·5°C.	„	39·8°C.	„	very numerous	„
27th	„	„	39·4°C.	„	38·6°C.	„	„	„
28th	„	„	40·4°C.	„	40·6°C.	„	„	„
29th	„	„	40·4°C.	„	40·6°C.	„	„	„
30th	„	„	40·3°C.	„	40·5°C.	„	„	„
31st	„	„	40·1°C.	„	40·3°C.	„	„	„
1st	*April*	„	39·6°C.	„	39·9°C.	„	numerous	„
2nd	„	„	39·8°C.	„	38·7°C.	„	„	„
3rd	„	„	39·4°C.	„	39·3°C.	„	„	„
4th	„	„	39·4°C.	„	39·8°C.	„	„	„
5th	„	„	39·7°C.	„	39·9°C.	„	„	„
6th	„	„	39·6°C.	„	39·8°C.	„	„	„
7th	„	„	39·4°C.	„	39·6°C.	„	„	„
8th	„	„	39·4°C.	„	40·5°C.	„	„	„
9th	„	„	40·3°C.	„	40·6°C.	„	„	„
10th	„	„	40·3°C.	„	40·5°C.	„	very numerous	„
11th	„	„	40·2°C.	„	40·5°C.	„	„	„
12th	„	„	40°C.	„	40·4°C.	„	„	„
13th	„	„	40·2°C.	„	40·5°C.	„	numerous	„
14th	„	„	40·5°C.	„	40·7°C.	„	„	„
15th	„	„	40·4°C.	„	40·6°C.	„	„	„
16th	„	„	40·4°C.	„	40·7°C.	„	few in	„
17th	„	„	40·6°C.	„	40·8°C.	„	„	„
18th	„	„	40·1°C.	„	40·4°C.	„	numerous	„
19th	„	„	40·2°C.	„	40·5°C.	„	„	„
20th	„	„	40·2°C.	„	40·5°C.	„	„	„
21st	„	„	40·2°C.	„	40·5°C.	„	„	„
22nd	„	„	39·9°C.	„	39·8°C.	„	„	„
23rd	„	„	40°C.	„	40·3°C.	„	absent from	„
24th	„	„	40°C.	„	40·4°C.	„	„	„
25th	„	„	40·2°C.	„	40·5°C.	„	few in	„
26th	„	„	39·9°C.	„	39·8°C.	„	„	„
27th	„	„	39·8°C.	„	40·3°C.	„	„	„
28th	„	„	40°C.	„	40·4°C.	„	„	„
29th	„	„	40°C.	„	40·6°C.	„	„	„
30th	„	„	39·7°C.	„	39·9°C.	„	numerous	„
1st	*May*	„	40·2°C.	„	40·4°C.	„	few in	„
2nd	„	„	39·6°C.	„	40·4°C.	„	„	„
3rd	„	„	39·8°C.	„	40·1°C.	„	„	„
4th	„	„	39·7°C.	„	40·2°C.	„	„	„
5th	„	„	39·8°C.	„	40·1°C.	„	numerous	„
6th	„	„	39·7°C.	„	40·2°C.	„	few	„
7th	„	„	40°C.	„	40·3°C.	„	absent from	„
8th	„	„	40·1°C.	„	40·1°C.	„	„	„
9th	„	„	39·8°C.	„	40·4°C.	„	few in	„
10th	„	„	41·1°C.	„	40·5°C.	„	„	„
11th	„	„	40·1°C.	„	40·5°C.	„	numerous	„
12th	„	„	40·4°C.	„	40·7°C.	„	„	„
13th	„	„	40·3°C.	„	40·6°C.	„	„	„
14th	„	„	40·3°C.	„	40·5°C.	„	few in	„
15th	„	„	40·4°C.	„	40·6°C.	„	„	„

16th	*May.*—Temp.	A.M.	40·4°C.	P.M.	40·7°C.	Hæmatozoa	numerous	in the blood.
17th	„	„	40·4°C.	„	39·8°C.	„	„	„
18th	„	„	39·5°C.	„	39·8°C.	„	„	„
19th	„	„	40°C.	„	40·5°C.	„	„	„
20th	„	„	40·2°C.	„	40·4°C.	„	„	„
21st	„	„	40·2°C.	„	40·4°C.	„	few	„
22nd	„	„	40°C.	„	40·3°C.	„	numerous	„
23rd	„	„	40·1°C.	„	40·6°C.	„	„	„
24th	„	„	40·6°C.	„	40·7°C.	„	numerous	„
25th	„	„	40·5°C.	„	40·4°C.	„	„	„
26th	„	„	39·9°C.	„	40·5°C.	„	„	„
27th	„	„	40·2°C.	„	40·3°C.	„	„	„
28th	„	„	39·9°C.	„	40·2°C.	„	„	„
29th	„	„	39·7°C.	„	40·6°C.	„	absent from	„
30th	„	„	40·5°C.	„	40·5°C.	„	numerous in	„
31st	„	„	40·4°C.	„	40·3°C.	„	„	„
1st *June*		„	40·1°C.	„	39·3°C.	„	few	„
2nd	„	Found dead.						

AUTOPSY.—June 2nd, 9 A.M.

The animal is somewhat emaciated and the abdomen distended.

Thorax.—No fluid in the pleural cavities.

Lungs.—Fully distended filling up the thoracic cavity and bulging on removal of the anterior thoracic wall; both lungs are the seat of general emphysema.

Heart.—Right side fully distended with clots dark in colour; left side contracted. No petechiæ in the auricles or ventricles.

Liver.—Large, normal in colour; *on section* presents a healthy appearance. Gall bladder full of clear and transparent colourless fluid.

Spleen.—Large and the tissue firm; no petechiæ on the capsule.

Stomach.—Healthy.

Kidneys.—Left is much larger than the right; quite ⅓rd larger; presents a healthy appearance *on section.*

No. II.—YOUNG GUINEA-PIG, 67 *days old* (*Mother, No. III.—Guinea-Pig*).

4th February.—Inoculated subcutaneously in the Inguinal Region with ·2 c. c. of blood, containing numerous hæmatozoa taken from Horse No. XI.

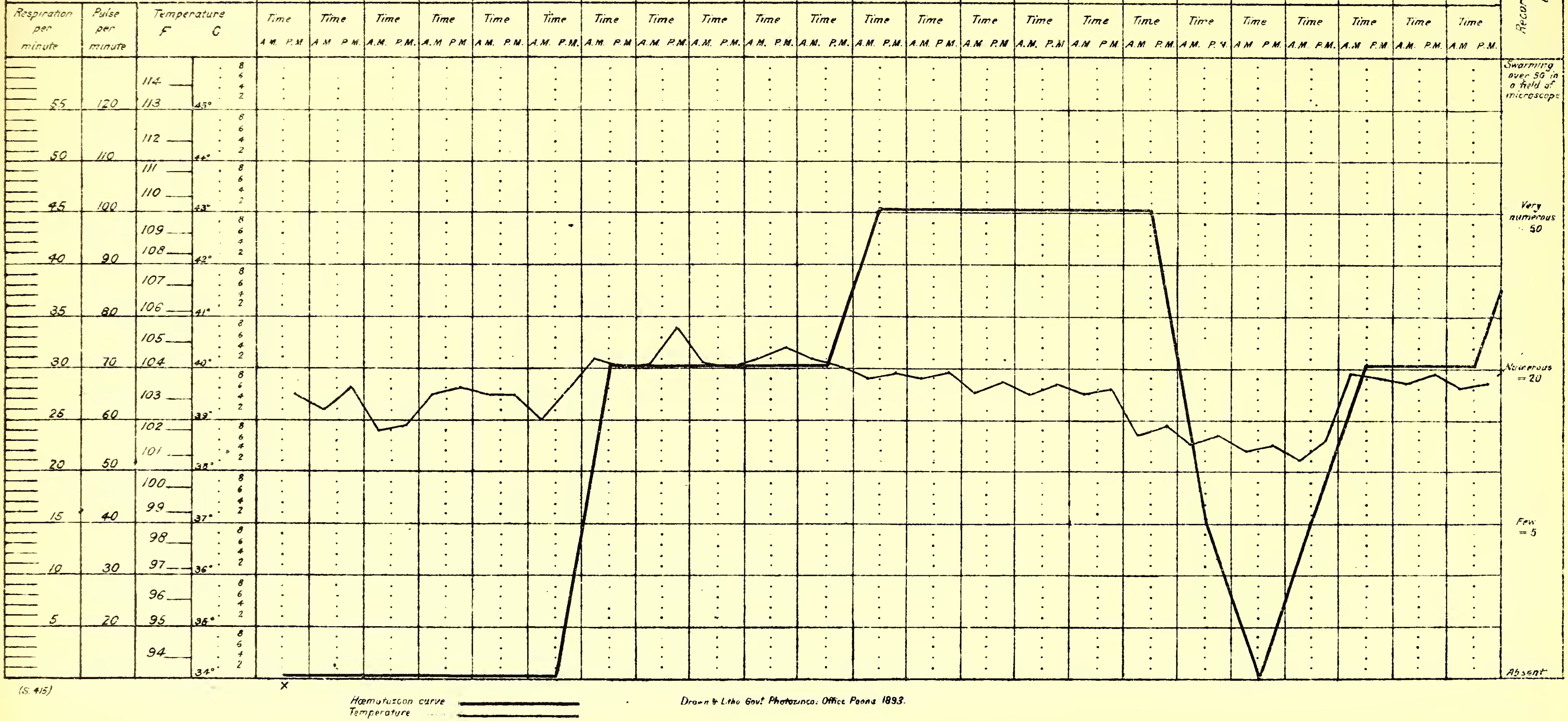
		Temp. A.M.	——	P.M.	39·7°C.	Hæmatozoa	absent from	the blood.
5th	„	„	39·4°C.	„	39·7°C.	„	„	„
6th	„	„	38°C.	„	38·4°C.	„	„	„
7th	„	„	38·6°C.	„	39°C.	„	„	„
8th	„	„	39·1°C.	„	39·3°C.	„	„	„
9th	„	„	39·1°C.	„	39·4°C.	„	„	„
10th	„	„	39·5°C.	„	39·8°C.	„	few in the	„
11th	„	„	39·7°C.	„	39·9°C.	„	„	„
12th	„	„	39·7°C.	„	39·9°C.	„	numerous	„
13th	„	„	39·8°C.	„	39·9°C.	„	„	„
14th	„	„	39·9°C.	„	39·7°C.	„	„	„
15th	„	„	38·5°C.	„	38·7°C.	„	„	„
16th	„	„	38·7°C.	„	38·9°C.	„	„	„
17th	„	„	39·2°C.	„	39·5°C.	„	„	„
18th	„	„	39·3°C.	„	39·6°C.	„	„	„
19th	„	„	39·3°C.	„	39·5°C.	„	„	„
20th	„	„	39°C.	„	39·3°C.	„	„	„
21st	„	„	39°C.	„	39·3°C.	„	„	„
22nd	„	„	39·3°C.	„	39·5°C.	„	„	„

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Young One of Guinea Pig III (Pregnant Doe) Inoculated with 0·2 c.c. of blood, Horse No. XI. Age ______ Sex ______ Colour ______

Disease "Surra" ______ Date of Inoculation, 4th February 1891. Result, Death. ______ Date of Result, 2.6.91. ______ Register No. I.

Dates of Observation.	Feby. 4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Days of Disease							1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Organisms in Blood.	—	—	—	—	—	—	N	N	N	N	N	VN	VN	VN	VN	VN	VN	F	—	F	N	N	N



(S. 415)

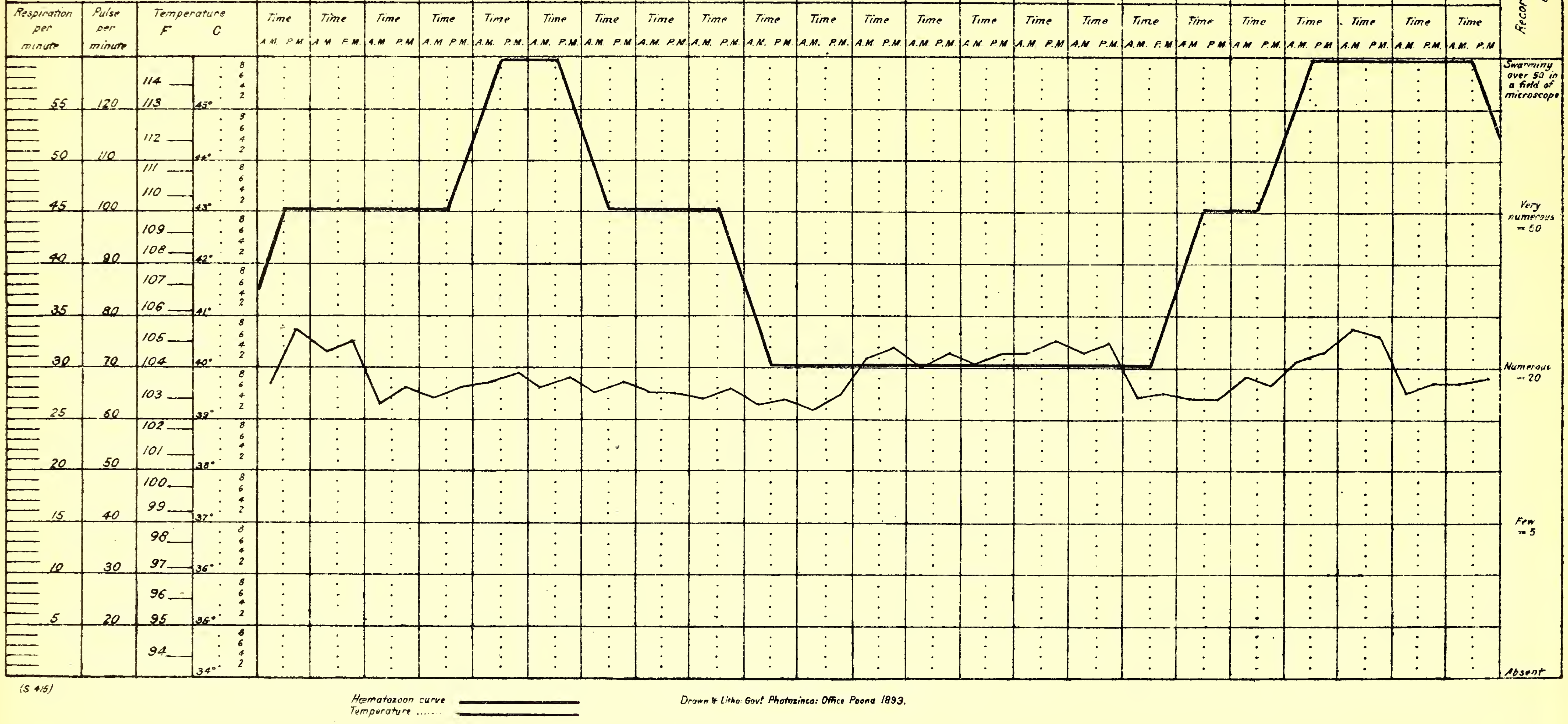
Drawn & Litho Govt. Photozinco. Office Poona 1893.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

______ Age ______ Sex ______ Colour ______

Disease ______ Date of ______ Result ______ Date of Result ______ Register No. ______

Dates of Observation.	Febr.y 27	28	March 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Days of Disease	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Organisms in Blood.	VN	VN	VN	VN	S	S	VN	VN	VN	N	N	N	N	N	N	N	N	VN	VN	S	S	S	S



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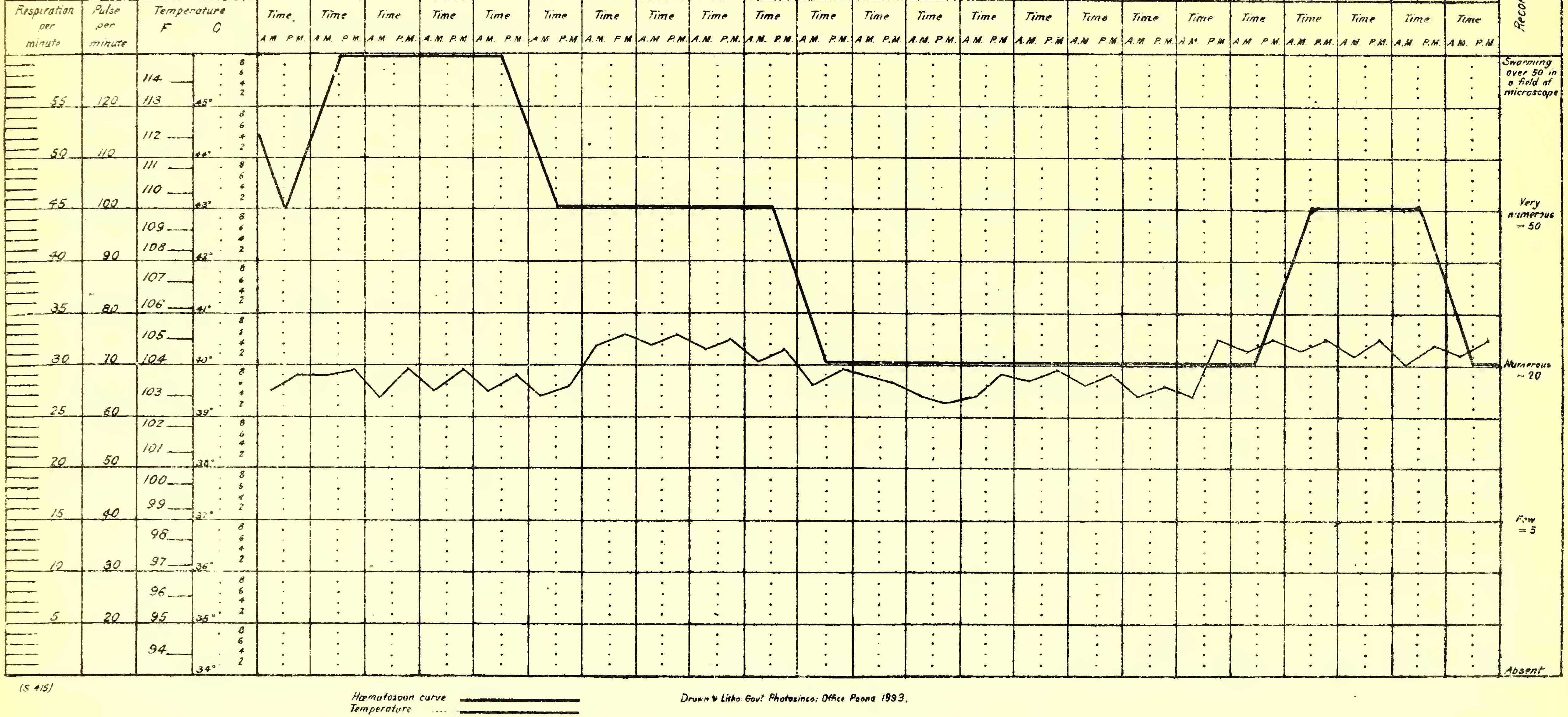
Drawn & Litho: Govt. Photozinco: Office Poona 1893.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

__________ Age _____ Sex _____ Colour _____

Disease _____ Date of _____ Result _____ Date of Result _____ Register No. _____

Dates of Observation.	March 22	23	24	25	26	27	28	29	30	31	April 1	2	3	4	5	6	7	8	9	10	11	12	13
Days of Disease	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63
Organisms in Blood.	VN	S	S	S	S	VN	VN	VN	VN	VN	N	N	N	N	N	N	N	N	N	VN	VN	VN	N



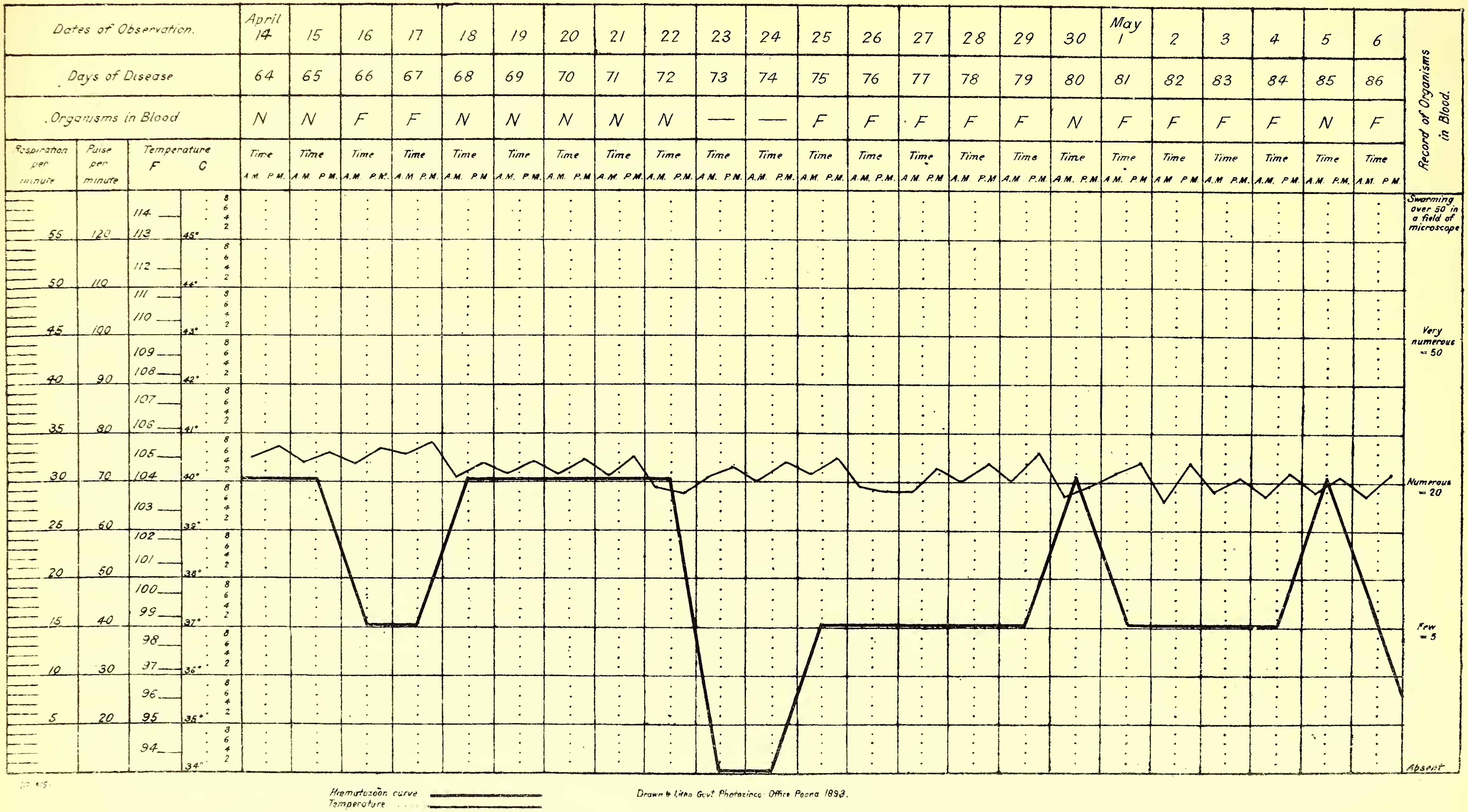
(S 415)

Drawn & Litho: Govt Photozinco: Office Poona 1893.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age ____ Sex ____ Colour ____

Disease ____ Date of ____ Result ____ Date of Result ____ Register No. ____



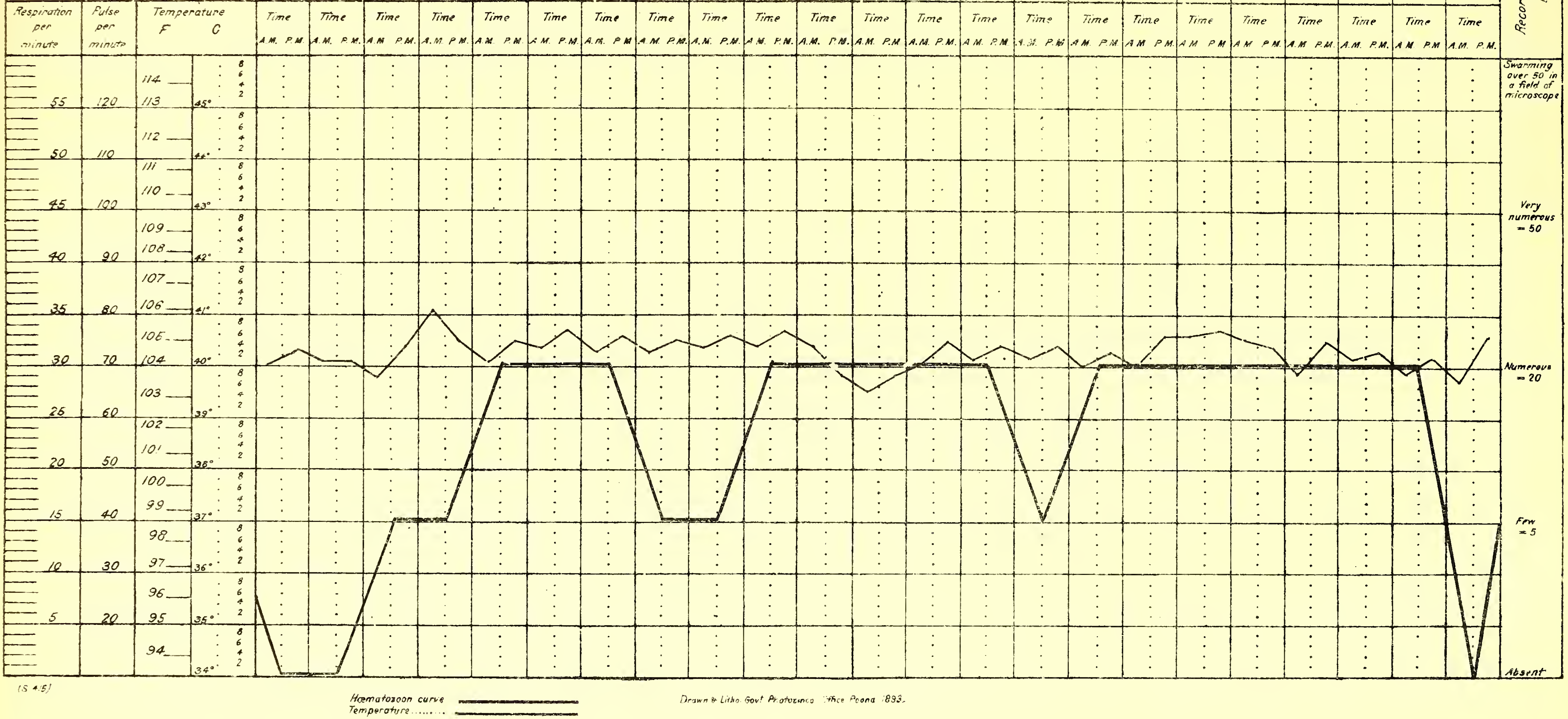
Drawn & Litho Govt. Photozinco. Office Poona 1898.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age ____ Sex ____ Colour ____

Disease ____ Date of ____ Result ____ Date of Result ____ Register No. ____

Dates of Observation.	May 7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
Days of Disease	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109
Organisms in Blood.	—	—	F	F	N	N	N	F	F	N	N	N	N	N	F	N	N	N	N	N	N	N	—



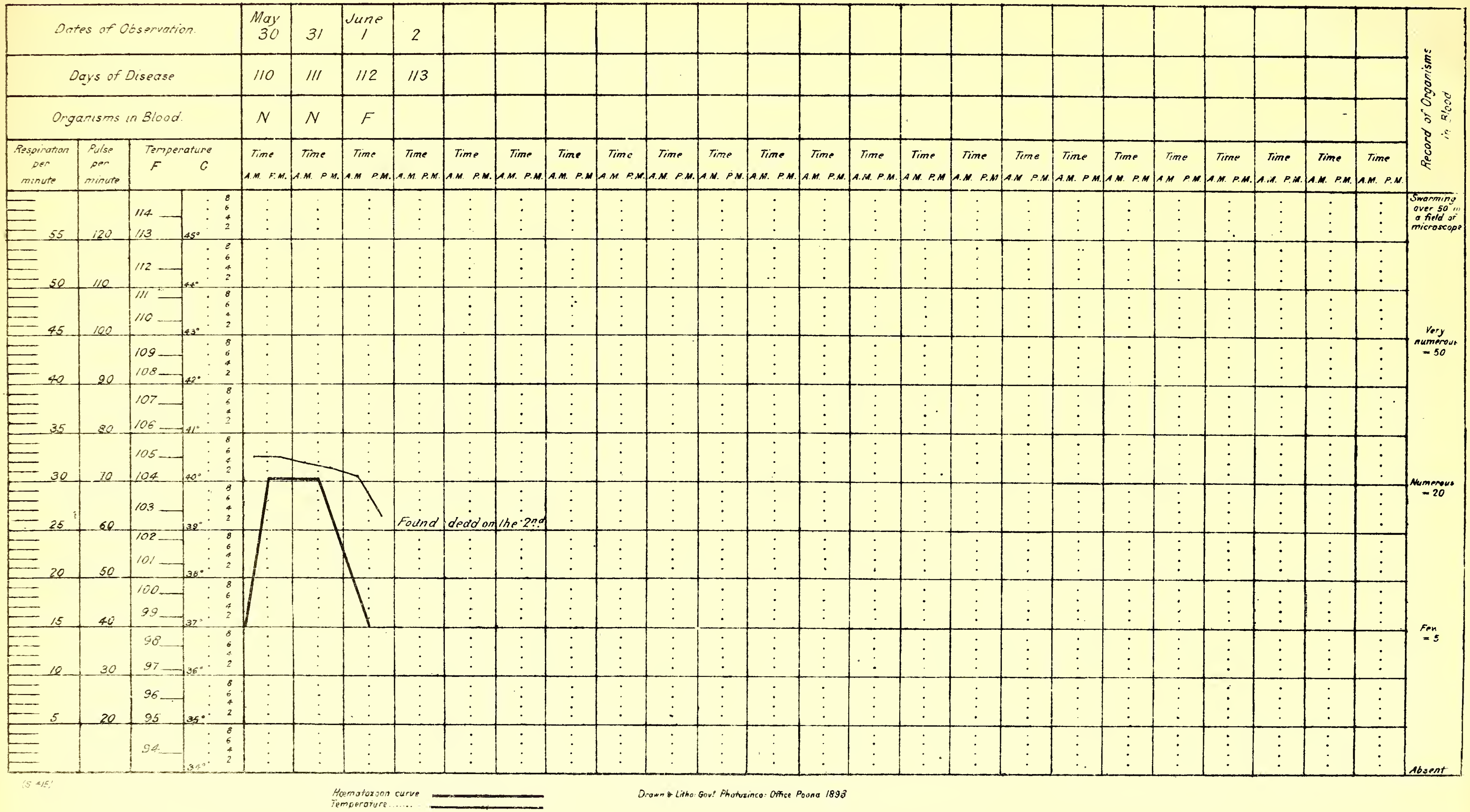
(S 4:5)

Drawn & Litho. Govt. Photozinco Office Poona 1893.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age Sex Colour

Disease Date of Result Date of Result Register No.



(S 415)

Drawn & Litho: Govt Photozinco: Office Poona 1898

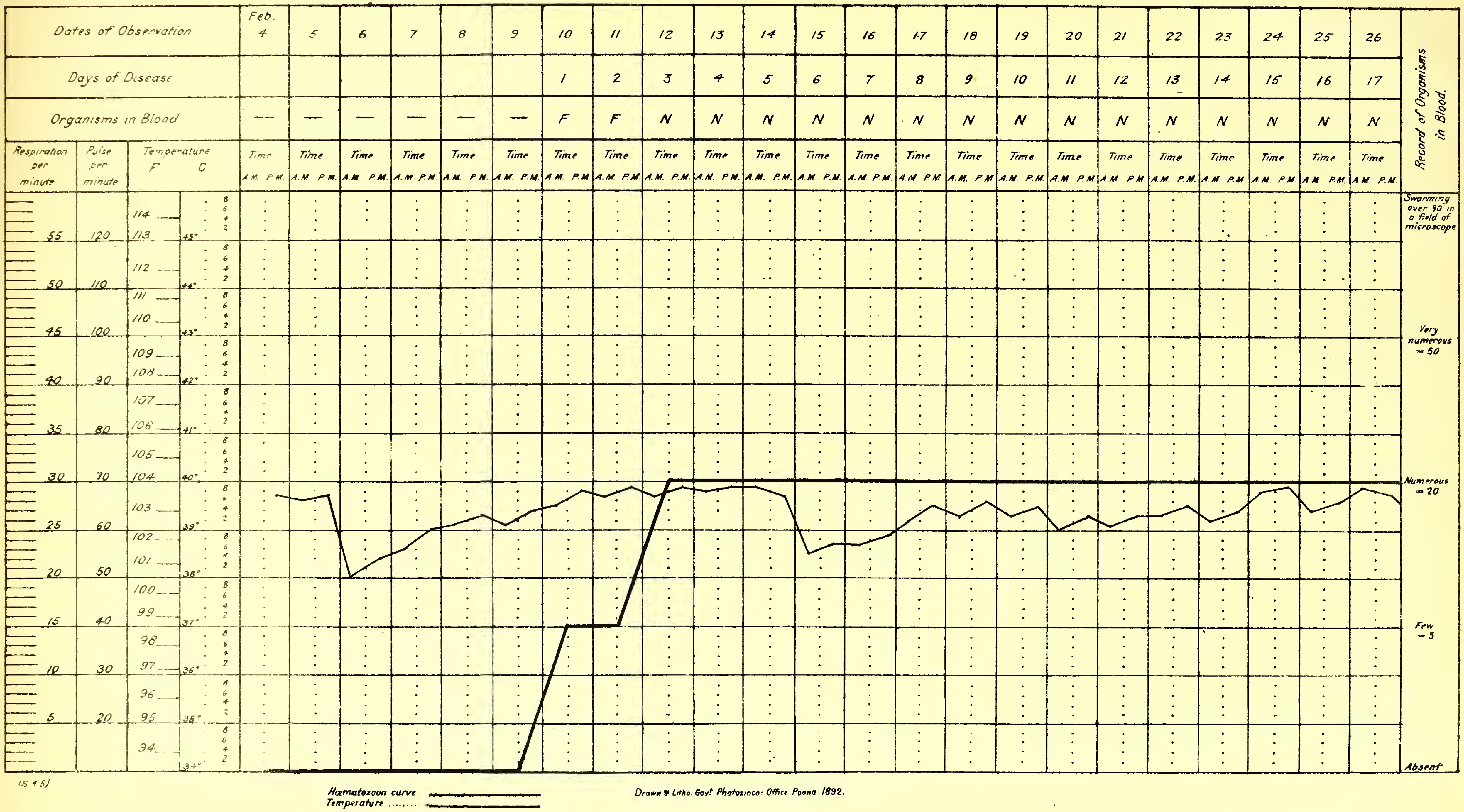
23*rd February.*—	Temp. A.M.	39·2°C.	P.M.	39·4°C.	Hæmatozoa	numerous	in the blood.
24*th* „	„	39·8°C.	„	39·9°C.	„	„	„
25*th* „	„	39·4°C.	„	39·6°C.	„	„	„
26*th* „	„	39·9°C.	„	39·8°C.	„	„	„
27*th* „	„	39·5°C.	„	40·9°C.	„	„	„
28*th* „	„	40·7°C.	„	40·9°C.	„	very numerous	„
1*st March*	„	40°C.	„	40·2°C.	„	„	„
2*nd* „	„	40·1°C.	„	40·3°C.	„	„	„
3*rd* „	„	40°C.	„	40·5°C.	„	„	„
4*th* „	„	40·2°C.	„	40·5°C.	„	„	„
5*th* „	„	40·3°C.	„	40·8°C.	„	„	„
6*th* „	„	40·2°C.	„	40·5°C.	„	„	„
7*th* „	„	40·3°C.	„	39·8°C.	„	very numerous	„
8*th* „	„	39·4°C.	„	39·6°C.	„	numerous	„
9*th* „	„	39·4°C.	„	39·7°C.	„	„	„
10*th* „	„	40·4°C.	„	40·4°C.	„	„	„
11*th* „	„	39·8°C.	„	39·9°C.	„	„	„
12*th* „	„	39·5°C.	„	39·8°C.	„	„	„
13*th* „	„	40·4°C.	„	40·7°C.	„	„	„
14*th* „	„	40·5°C.	„	40·4°C.	„	„	„
15*th* „	„	39·5°C.	„	39·8°C.	„	„	„
16*th* „	„	39·9°C.	„	39·8°C.	„	„	„
17*th* „	„	39·5°C.	„	39·7°C.	„	„	„
18*th* „	„	39·9°C.	„	39·8°C.	„	„	„
19*th* „	„	39·9°C.	„	40·1°C.	„	very numerous	„
20*th* „	„	39·4°C.	„	39·7°C.	„	„	„
21*st* „	„	40°C.	„	40·4°C.	„	„	„
22*nd* „	„	40·1°C.	„	40·2°C.	„	„	„
23*rd* „	„	40·1°C.	„	40°C.	„	„	„
24*th* „	„	40°C.	„	40·3°C.	„	„	„
25*th* „	„	39·6°C.	„	39·8°C.	„	„	„
26*th* „	„	39·6°C.	„	39·8°C.	„	„	„
27*th* „	„	39·5°C.	„	39·7°C.	„	numerous	„
28*th* „	„	40·2°C.	„	40·5°C.	„	„	„
29*th* „	„	40·1°C.	„	40·4°C.	„	„	„
30*th* „	„	40·2°C.	„	40·6°C.	„	„	„
31*st* „	„	39·8°C.	„	39·9°C.	„	„	„
1*st April*	„	39·7°C.	„	39·8°C.	„	absent from	„
2*nd* „	„	39·6°C.	„	39·5°C.	„	numerous in	„
3*rd* „	„	39·3°C.	„	40·3°C.	„	„	„
4*th* „	„	39·6°C.	„	39·7°C.	„	„	„
5*th* „	„	40°C.	„	40·3°C.	„	few in	„
6*th* „	„	40·1°C.	„	40°C.	„	„	„
7*th* „	„	39·6°C.	„	39·8°C.	„	„	„
8*th* „	„	39·6°C.	„	40·6°C.	„	absent from	„
9*th* „	„	40·2°C.	„	40·5°C.	„	„	„
10*th* „	„	40·3°C.	„	40·5°C.	„	„	„
11*th* „	„	40·4°C.	„	40·7°C.	„	few in	„
12*th* „	„	40·2°C.	„	40·4°C.	„	„	„
13*th* „	„	40·7°C.	„	40·5°C.	„	„	„
14*th* „	„	40·3°C.	„	40·5°C.	„	absent from	„
15*th* „	„	40·3°C.	„	40·5°C.	„	„	„
16*th* „	„	40·3°C.	„	40·6°C.	„	numerous in	„
17*th* „	„	40·4°C.	„	40·6°C.	„	„	„
18*th* „	„	39·5°C.	„	39·7°C.	„	„	„
19*th* „	„	39·5°C.	„	39·8°C.	„	„	„

20*th*	*April*.—	Temp. A.M.	39·7°C.	P.M.	39·7°C.	Hæmatozoa	numerous in	the blood.
21*st*	„	„	40·2°C.	„	40·7°C.	„	„	„
22*nd*	„	„	39·7°C.	„	39·9°C.	„	„	„
23*rd*	„	„	39·9°C.	„	40·4°C.	„	„	„
24*th*	„	„	40·3°C.	„	40·6°C.	„	„	„
25*th*	„	„	40·3°C.	„	40·1°C.	„	„	„
26*th*	„	„	39·5°C.	„	39·9°C.	„	„	„
27*th*	„	„	39·8°C.	„	40·2°C.	„	„	„
28*th*	„	„	39·8°C.	„	40·1°C.	„	„	„
29*th*	„	„	39·5°C.	„	40·3°C.	„	„	„
30*th*	„	„	40·4°C.	„	40·6°C.	„	few in	„
1*st*	*May*	„	40·3°C.	„	40·6°C.	„	absent from	„
2*nd*	„	„	39·8°C.	„	40·3°C.	„	„	„
3*rd*	„	„	40·1°C.	„	40·3°C.	„	few in	„
4*th*	„	„	39·7°C.	„	40·3°C.	„	„	„
5*th*	„	„	39·6°C.	„	40·1°C.	„	„	„
6*th*	„	„	39·4°C.	„	40·3°C.	„	„	„
7*th*	„	„	40·1°C.	„	40·2°C.	„	„	„
8*th*	„	„	40·3°C.	„	40·6°C.	„	absent from	„
9*th*	„	„	40·4°C.	„	41·2°C.	„	few in	„
10*th*	„	„	40·1°C.	„	40·4°C.	„	absent from	„
11*th*	„	„	40·5°C.	„	40·7°C.	„	„	„
12*th*	„	„	40·3°C.	„	40·5°C.	„	numerous in	„
13*th*	„	„	40·2°C.	„	41·4°C.	„	„	„
14*th*	„	„	41·1°C.	„	40·9°C.	„	absent from	„
15*th*	„	„	40·7°C.	„	40·4°C.	„	„	„
16*th*	„	„	40·1°C.	„	40·4°C.	„	few in	„
17*th*	„	„	40·2°C.	„	40·3°C.	„	absent from	„
18*th*	„	„	39·9°C.	„	40·2°C.	„		„
19*th*	„	„	40·1°C.	„	40·5°C.	„	numerous in	„
20*th*	„	„	40·4°C.	„	40·7°C.	„	few in	„
21*st*	„	„	40·3°C.	„	40·9°C.	„	numerous in	„
22*nd*	„	„	40·8°C.	„	40·7°C.	„	absent from	„
23*rd*	„	„	40·6°C.	„	40·7°C.	„	few in	„
24*th*	„	„	40°C.	„	40·5°C.	„	absent from	„
25*th*	„	„	40·1°C.	„	40·5°C.	„	numerous in	„
26*th*	„	„	40·6°C.	„	40·7°C.	„	„	„
27*th*	„	„	40·4°C.	„	40·4°C.	„	absent from	„
28*th*	„	„	39·7°C.	„	40·4°C.	„	„	„
29*th*	„	„	40°C.	„	40·3°C.	„	„	„
30*th*	„	„	39·7°C.	„	40·4°C.	„	few in	„
31*st*	„	„	40·1°C.	„	40·5°C.	„	numerous in	„
1*st*	*June*	„	40·2°C.	„	40·1°C.	„	few in	„
2*nd*	„	„	39·8°C.	„	40·2°C.	„	numerous in	„
3*rd*	„	„	39·7°C.	„	40·4°C.	„	very numerous	„
4*th*	„	„	40·1°C.	„	40·5°C.	„	few in	„
5*th*	„	„	40·1°C.	„	39·9°C.	„	„	„
6*th*	„	„	39·5°C.	„	40·4°C.	„	„	„
7*th*	„	„	40·1°C.	„	40·2°C.	„	„	„
8*th*	„	„	39·7°C.	„	40·9°C.	„	numerous	„
9*th*	„	„	40·8°C.	„	40·9°C.	„	very numerous	„
10*th*	„	„	40·7°C.	„	40·8°C.	„	swarming	„
11*th*	„	„	40·5°C.	„	40·8°C.	„	few in	„
12*th*	„	„	40·6°C.	„	40·9°C.	„	„	„
13*th*	„	„	40·7°C.	„	40·8°C.	„	absent from	„
14*th*	„	„	40·5°C.	„	40·7°C.	„	few in	„

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Young one of Guinea Pig III (Pregnant Doe) inoculated Subcutaneously with 0·2 cc of blood Horse Nº XI — Age, 67 days Sex — Colour —

Disease, 'Surra' — Date of Inoculation, 4th Feb. 1891 — Result, Death — Date of Result, 3. 7. 91 — Register No. II —



(S 4 5)

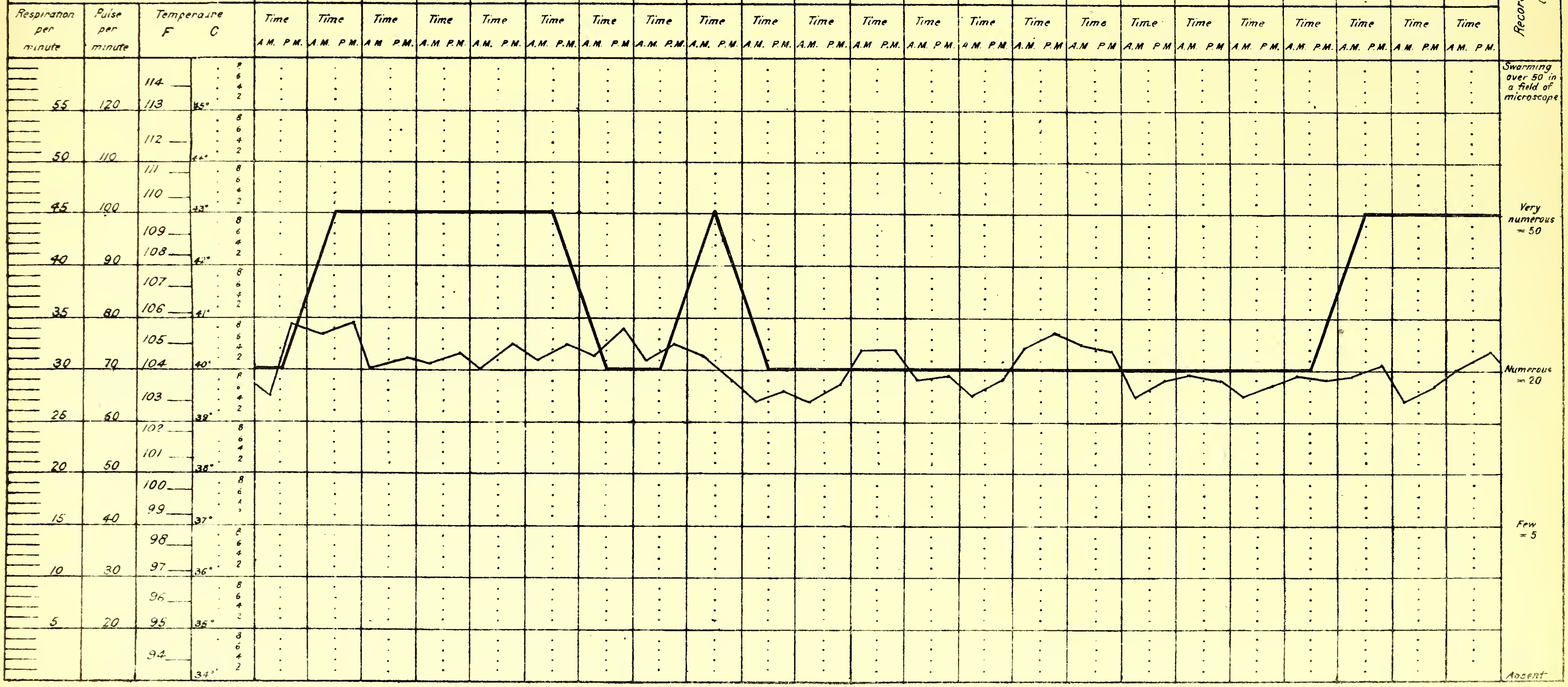
Drawn & Litho: Govt Photozinco: Office Poona 1892.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age ______ Sex ______ Colour ______

Disease ______ Date of ______ Result ______ Date of Result ______ Register No. ______

Dates of Observation	Feb. 27	28	Mar. 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Days of Disease	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Organisms in Blood	N	VN	VN	VN	VN	VN	N	N	VN	N	N	N	N	N	N	N	N	N	N	N	VN	VN	VN



(S 415)

Hæmatozoon curve ———

Temperature .....

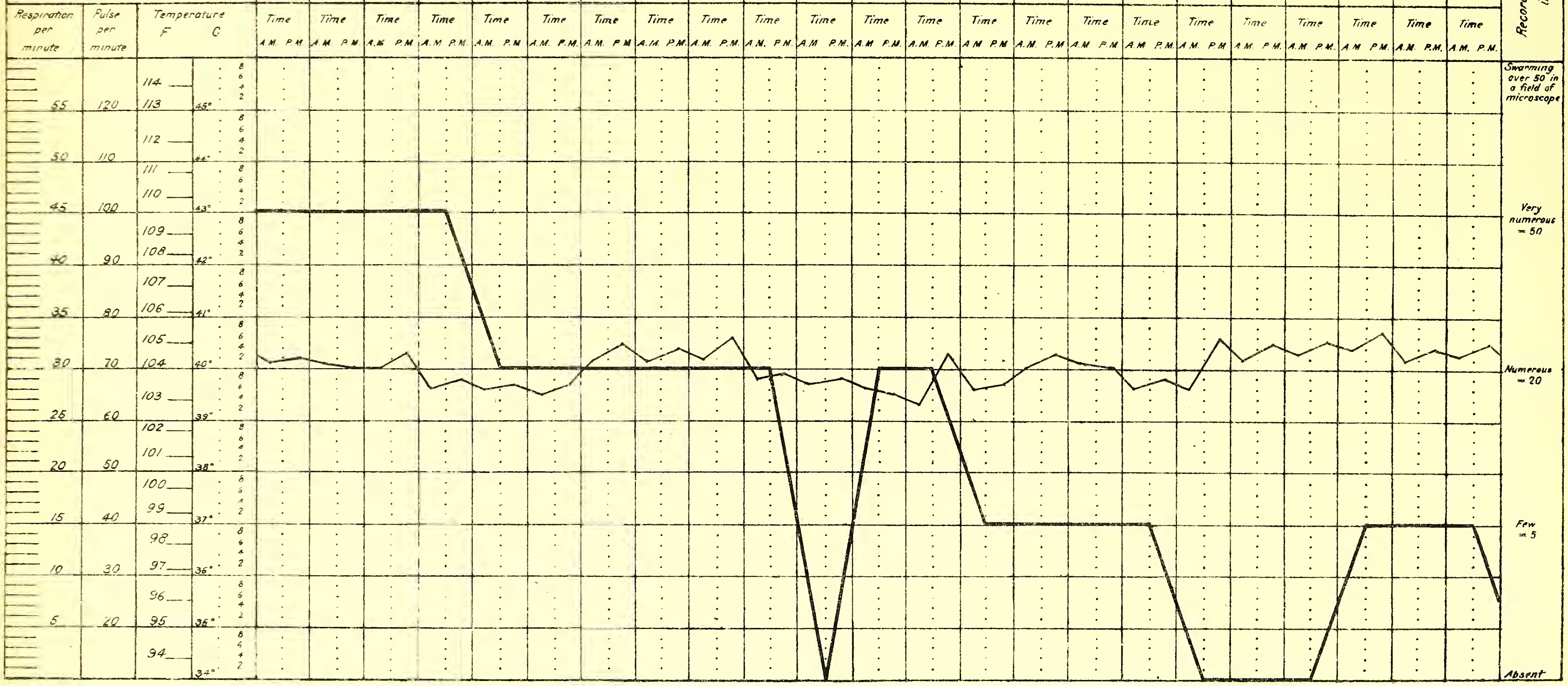
Drawn & Litho Govt. Photozinco. Office Poona 1892.

RECORDS OF TEMPERATURE PULSE AND RESPIRATION.

Age ________ Sex ________ Colour ________

Disease ________ Date of ________ Result ________ Date of Result ________ Register No. ________

Dates of Observation	Mar. 22	23	24	25	26	27	28	29	30	31	April 1	2	3	4	5	6	7	8	9	10	11	12	13
Days of Disease	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63
Organisms in Blood.	VN	VN	VN	VN	N	N	N	N	N	N	—	N	N	F	F	F	F	—	—	—	F	F	F



(S 415)

Hœmatozoon curve
Temperature

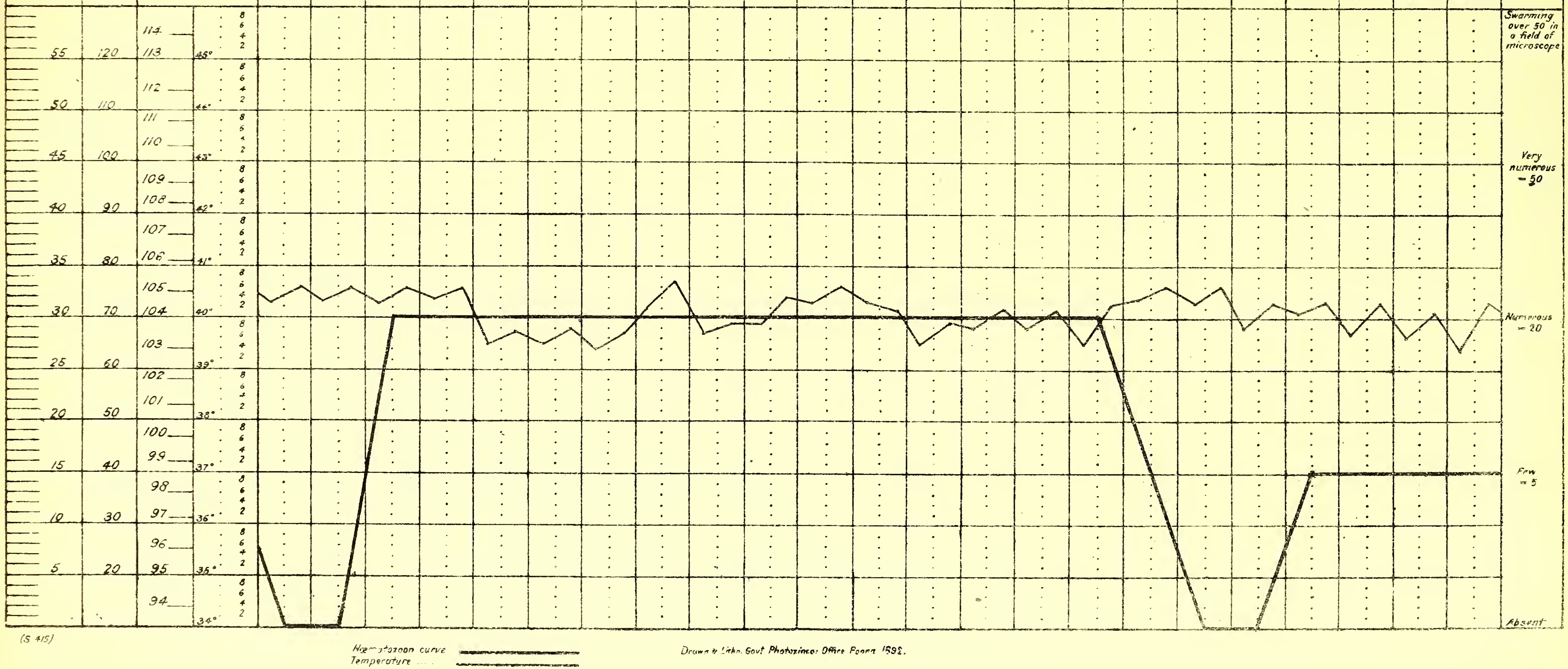
Drawn & Litho: Govt Photozinco: Office Poona 1892.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age ______ Sex ______ Colour ______

Disease ______ Date of ______ Result ______ Date of Result ______ Register No. ______

Dates of Observation.	April 14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	May 1	2	3	4	5	6	Record of Organisms in Blood.
Days of Disease	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	80	81	82	83	84	85	
Organisms in Blood	—	—	N	N	N	N	N	N	N	N	N	N	N	N	N	N	F	—	—	F	F	F	F	
Respiration per minute / Pulse per minute / Temperature F C	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	



(S 415)

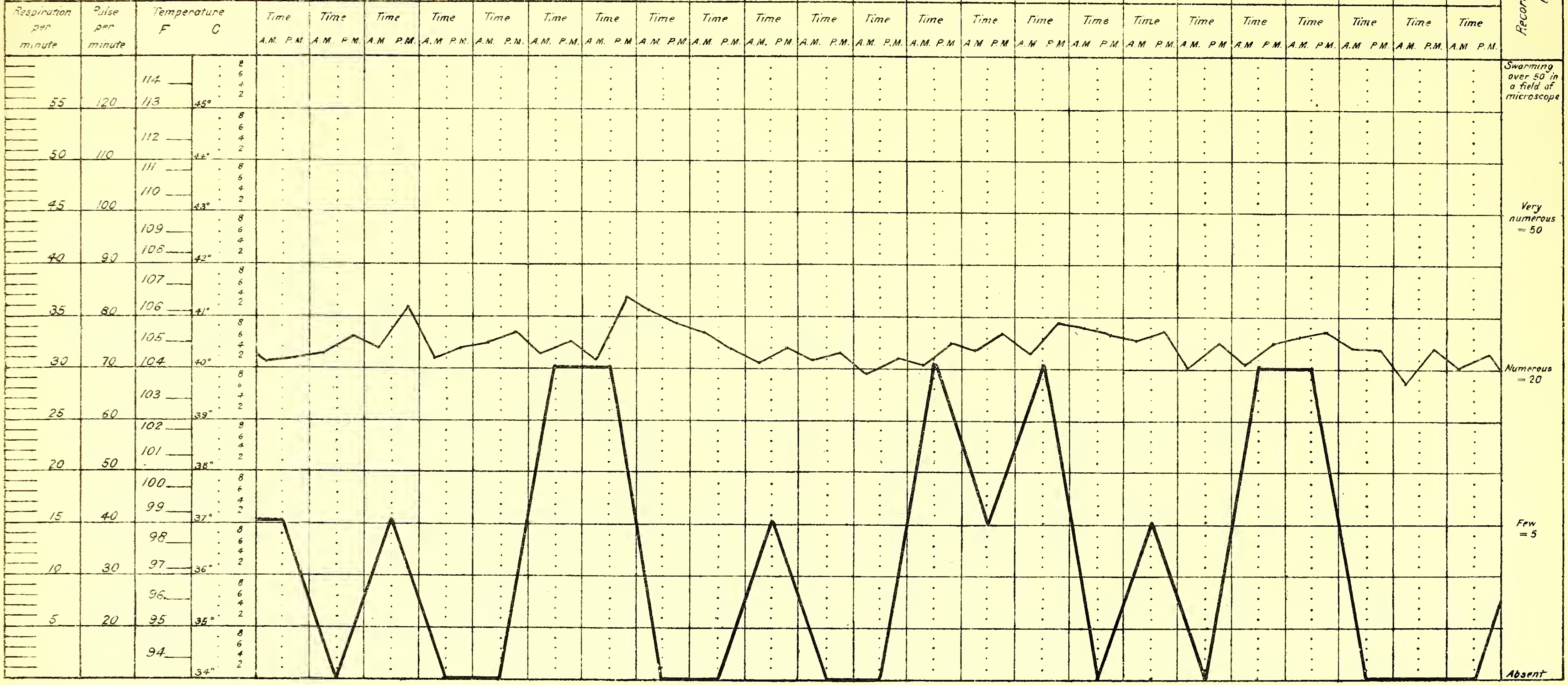
Drawn & Litho. Govt Photozinco: Office Poona 1892.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

__________ Age ______ Sex ______ Colour ______

Disease ______ Date of ______ Result ______ Date of Result ______ Register No. ______

Dates of Observation.	May 7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
Days of Disease	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109
Organisms in Blood.	F	—	F	—	—	N	N	—	—	F	—	—	N	F	N	—	F	—	N	N	—	—	—



(S 415)

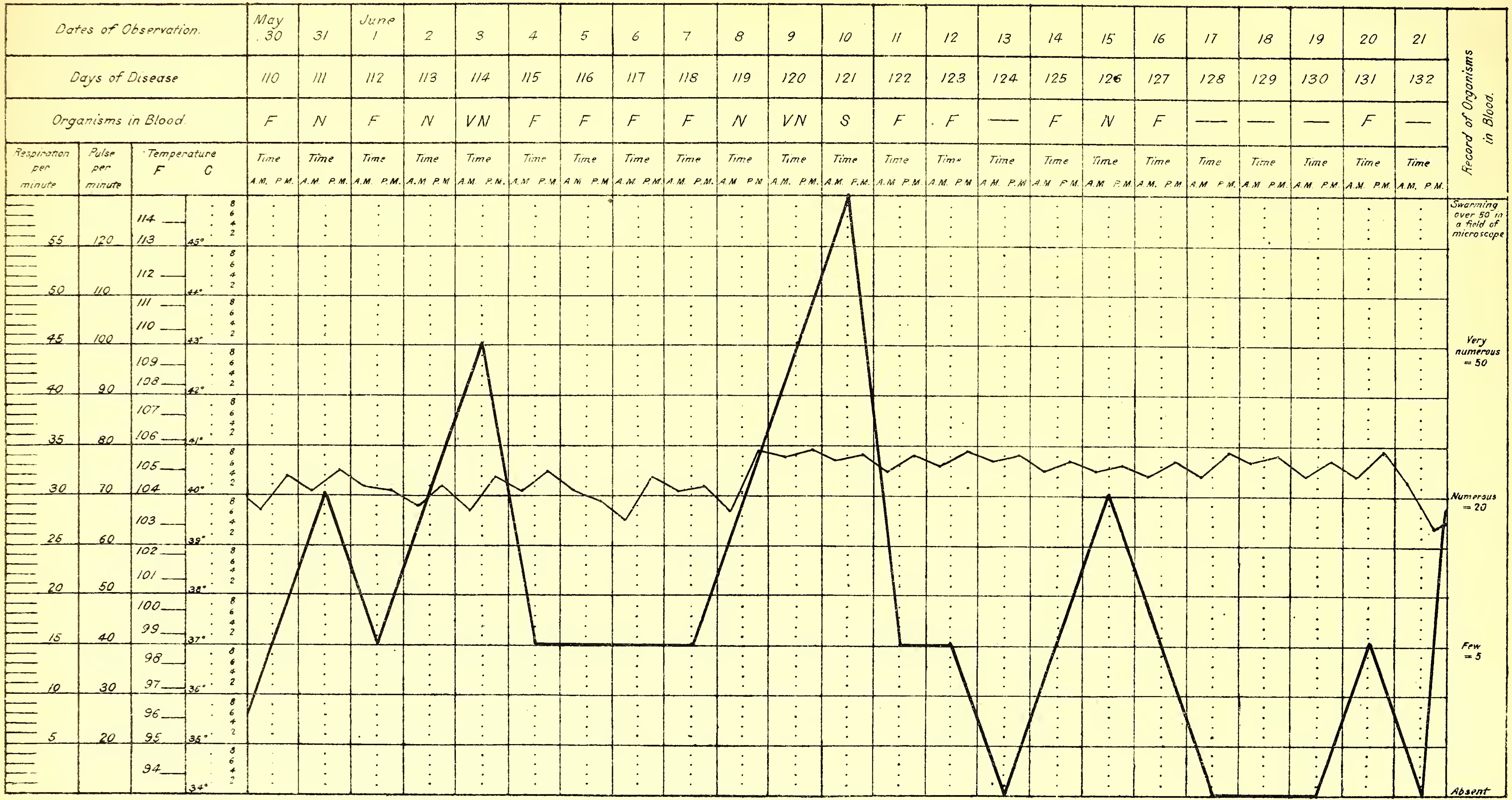
Hæmatozoon curve
Temperature ....

Drawn & Litho: Govt Photozinco: Office Poona 1892.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age ______ Sex ______ Colour ______

Disease ______ Date of ______ Result ______ Date of Result ______ Register No. ______



Dates of Observation.	May 30	31	June 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Days of Disease	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132
Organisms in Blood.	F	N	F	N	VN	F	F	F	F	N	VN	S	F	F	—	F	N	F	—	—	—	F	—

(S +15)

Hæmatozoon curve
Temperature ....

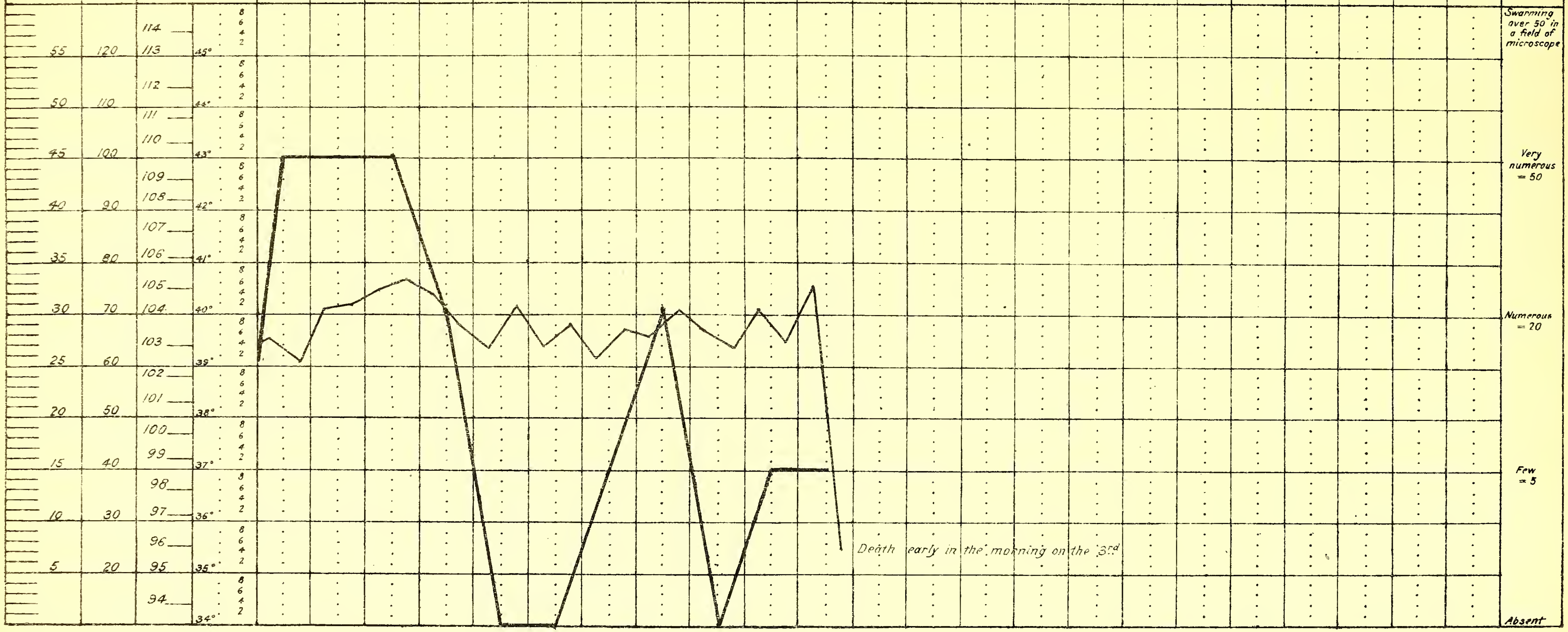
Drawn & Litho Govt Photozinco: Office Poona 1892.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age ____ Sex ____ Colour ____

Disease ____ Date of ____ Result ____ Date of Result ____ Register No. ____

Dates of Observation.	June 22	23	24	25	26	27	28	29	30	July 1	2	3											Record of Organisms in Blood.
Days of Disease	133	134	135	136	137	138	139	140	141	142	143												
Organisms in Blood.	VN	VN	VN	N	—	—	F	N	—	F	F												
Respiration per minute / Pulse per minute / Temperature F C	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	



(S. 415)

Hæmatozoon curve ————

Temperature .... ————

Drawn & Litho: Govt Photozinco: Office Poona 1892.

15*th* *June.*—	Temp. A.M.	40·5° C.	P.M.	40·6° C.	Hæmatozoa	numerous in the	blood.
16*th* „	„	40·4° C.	„	40·7° C.	„	few in	„
17*th* „	„	40·4° C.	„	40·9° C.	„	absent from	„
18*th* „	„	40·7° C.	„	40·8° C.	„	„	„
19*th* „	„	40·4° C.	„	40·7° C.	„	„	„
20*th* „	„	40·4° C.	„	40·9° C.	„	few in	„
21*st* „	„	40·3° C.	„	39·4° C.	„	„	„
22*nd* „	„	39·5° C.	„	39·1° C.	„	numerous in	„
23*rd* „	„	40·1° C.	„	40·2° C.	„	very numerous	„
24*th* „	„	40·4° C.	„	40·7° C.	„	„	„
25*th* „	„	40·4° C.	„	39·4° C.	„	absent from	„
26*th* „	„	39·4° C.	„	40·2° C.	„	„	„
27*th* „	„	39·4° C.	„	39·8° C.	„	„	„
28*th* „	„	39·2° C.	„	39·7° C.	„	few in	„
29*th* „	„	39·6° C.	„	40·1° C.	„	numerous	„
30*th* „	„	39·7° C.	„	39·4° C.	„	absent from	„
1*st July*	„	40·1° C.	„	39·5° C.	„	few in	„
2*nd* „	„	40·6° C.	„	35·5° C.	„	„	„

3*rd* „ Death took place early this morning.

AUTOPSY.—At 9 A.M.

Lungs are the seat of emphysema.

Heart.—Distended with clots, no petechiæ in its cavities.

Liver.—Large but healthy.

Spleen.—Large and firm ; no petechiæ.

Kidneys.—Large, capsules strip easily ; *on section* the tissues appear healthy.

Bladder.—Healthy.

Stomach.—Healthy.

RATS (MUS DECUMANUS) INOCULATED WITH HORSE-SURRA BLOOD.

Experiment I.—December 5th, 1890.—A rat was placed in a separate cage and its blood carefully examined in order to find out whether it was free from the hæmatozoon.

Daily examinations were conducted with this end in view until December 19th, but always with negative results. Consequently on that day at 1 P.M., the rat was inoculated subcutaneously with ·2c.c. of blood containing very numerous hæmatozoa, taken from the Jugular Vein of Horse No. VII.

20th December.—	The blood contained a few hæmatozoa.
21st ,,	,, ,, a few ,,
22nd ,,	,, ,, very numerous hæmatozoa.
23rd ,,	,, ,, ,, ,, ,,
24th ,,	,, ,, ,, ,, ,,
25th ,,	,, was swarming with very numerous hæmatozoa.
26th ,,	,, contained countless swarms of hæmatozoa. Death took place at noon.

AUTOPSY.—The body is well nourished, and on an examination of it being made, all the organs presented a healthy appearance, with the exception of the spleen, which was very much increased in size, of a dark-red colour, firm to the touch, and weighed two grammes.

Remarks.—The blood of this animal was submitted to careful microscopical examination for a period of fourteen days, and as the hæmatozoon was not observed in it, subcutaneous inoculation was made with ·2c.c. of blood containing very numerous hæmatozoa from the horse. On the next day a few organisms were found in the blood, which, in the course of a few days, increased to very numerous and swarming. The rat died on the seventh day after inoculation with its blood teeming with hæmatozoa. The chief points of interest in this case are :—

(i). The shortness of the period of incubation, *viz.*, one day only.

(ii). The exceedingly short time which elapsed between the appearance of the organism in the blood and death, clearly emphasizing the virulence of Surra-blood, when taken from the horse and injected into the rat (*Mus decumanus*).

Experiment II.—December 22nd, 1890.—Obtained three rats (*Mus decumanus*), two of which were full grown, and the third a young one about two months old. On careful microscopical examination of the blood of each animal no hæmatozoa could be discovered.

23rd December.—After a second careful examination of the blood of each animal with negative results, the full grown rats Nos. I and II were subcutaneously inoculated, each receiving ·1c.c. of blood containing a few hæmatozoa, taken from the Internal Jugular Vein of horse No. VII. The small rat No. III was not inoculated, but was placed in the cage with Nos. I and II to act as a control experiment.

Date.	Rat No. I.	Rat No. II.	Rat No. III.
December, 24th...	Hæmatozoa absent from the blood	Hæmatozoa absent from the blood	Hæmatozoa absent from the blood.
,, 25th...	,, few in the blood ...	,, few in the blood ...	,, absent ,,
,, 26th .	,, few ,, ...	,, numerous ,, ...	,, absent ,,
,, 27th...	,, numerous in the blood ...	,, very numerous ,, ...	,, few ,,
,, 28th...	,, very numerous ,, ...	,, very numerous ,, ...	,, few ,,
,, 29th...	,, very numerous ,, ...	,, swarming ,, ..	,, numerous ,,
,, 30th...	,, very numerous ,, ...	,, swarming ,, ...	,, very numerous ,,
,, 31st...	Found dead at 6 A.M.	Found dead at 6 A.M.	,, swarming ,,
January, 1st 1891.	... ...	... ...	Found dead at 5 A.M.

AUTOPSY.

No. I.—All the organs are healthy with the exception of the *spleen*, which is very much enlarged and presents numerous, small, raised extravasations of blood which are lying on the surface of the tissues underneath the capsule.

No. II.—The *Lungs* are the seat of localized emphysema, but there are no ecchymoses on the visceral pleuræ. *Liver* contains several cysts.

Stomach healthy. *Spleen* very much enlarged and presents numerous, small, raised extravasations of blood which are lying on the surface of the tissues underneath the capsule.

No. III.—The *Lungs* present one round ecchymosed spot, the size of a mustard seed at the base of the left organ. *Heart* contains thin watery blood, but no extravasations in the ventricles. *Stomach* healthy. *Liver* healthy. The *Spleen* is very much enlarged and presents localized patches of extravasation, which have given rise to elevations on the convex surface, lying under the capsule.

Remarks.—Three rats were selected, two full grown and one young one, on account of their blood being free from the hæmatozoon.

After two days the adult animals received 0·1 c. c. of blood containing a few organisms from the horse. The small one was not inoculated but placed with the two others to act as a control experiment. The period elapsing between the inoculation and the first appearance of the hæmatozoon in the blood of the adult animals, was two days, and on the fourth day after inoculation, the hæmatozoon was found in the blood of the young animal. Nos. I and II survived inoculation by eight days, and No. III by only nine.

The chief point of interest in this case is the fact, that the young rat in whose blood the hæmatozoon was absent during two days previous to being caged with two inoculated animal, should, in the course of a few days, contract the disease, and finally die only one day later than those inoculated. This opens up a question which will be treated of under the section of Rat Surra, Vol. II.

INOCULATION OF FIELD RATS (NESOKIA PROVIDENS) WITH HORSE-SURRA BLOOD.

Experiment I.—December 24th, 1890.—A field rat was placed in a separate cage and its blood carefully examined, in order to discover whether it was free from the hæmatozoon. Blood healthy.

25th.—Blood healthy.

26th.—Inoculated subcutaneously with 0·2 c.c. of blood containing numerous hæmatozoa, taken from the Jugular Vein of Horse No. VII.

27th.—No hæmatozoa in the blood.

28th.—A few hæmatozoa observed in the blood.

29th.—Hæmatozoa numerous in the blood.

30th.—Hæmatozoa very numerous in the blood.

31st.—Hæmatozoa swarming in the blood.

1st January 1891.—Hæmatozoa swarming in the blood.

2nd.—Hæmatozoa are numerous in the blood.

3rd.—Hæmatozoa are few in the blood.

4th.—Hæmatozoa are numerous in the blood.

5th.—Hæmatozoa are numerous in the blood.

6th.—Hæmatozoa are very numerous in the blood.

Death took place at 9-30 A.M.

AUTOPSY immediately after death.

The body is well nourished. *Thorax.* The pleural cavities are free from fluid. The *Lungs* are pale pink in colour, and perfectly healthy in appearance. The pericardial sac is free from fluid. *Heart* contains fluid blood. The right side is dilated and the left side contracted. *On section,* the cavities contain dark fluid blood, but no sub-endocardial extravasations are present. *Liver* normal in size and healthy.

Stomach externally appears healthy. *On section,* there is a dark-red clot of blood observed lying on the mucous membrane near the pyloric extremity about $\frac{1}{12}$th inch in thickness, and extending over about one-sixth of the surface of the mucous membrane. On removal of the clot, round petechiated spots become visible on the rugæ, but lying under the epithelial layer, these spots average about the size of a pin's head. There are several enlarged glands, dark-red in colour, lying, one in the hilum of the spleen and a second attached to the great omentum which is exactly opposite to the seat of the internal hæmorrhage. *Spleen* is considerably enlarged, but the tissues are firm and appear healthy *on section.*

Kidneys are pale, but appear to be healthy.

Intestines appear healthy, and present no pathological lesion.

Remarks.—The blood of this animal was submitted to careful microscopical examination for a period of three days, and as during that time the blood appeared healthy, and no hæmatozoa were observed, the animal was inoculated with 0·2 c. c. of blood, containing numerous organisms, taken from the horse. On the day but one following the inoculation, the hæmatozoon made its first appearance in the blood, and it gradually increased in numbers until on the eleventh day after inoculation, the animal succumbed to the disease, the blood presenting very numerous organisms.

The chief point of interest in this case is, that an animal in whose blood, the hæmatozoon has never been found, except when the subject of inoculation, should succumb to the disease in the short space of eleven days, and that some of the organs, at the *Post-mortem* should present certain definite pathological changes.

Experiment No. II —January 7th 1891, 2-30 P.M. Inoculated subcutaneously two field rats (Nesokia providens) Nos. I and II, each one receiving ·2 c.c. of blood containing numerous hæmatozoa, taken from the Jugular Vein of Horse No. VI.

Date.	No. I Rat.	No. II Rat.
1891.		
January 8th ...	Hæmatozoa absent from the blood ...	Hæmatozoa absent from the blood.
9th ...	,, ,, ...	,, ,,
10th ...	,, ,, ...	,, ,,
11th ...	,, ,, ...	,, ,,
12th ...	Hæmatozoa very numerous in the blood ...	Hæmatozoa numerous in the blood.
13th ...	,, very numerous in the blood ...	,, numerous in the blood.
14th ...	,, very numerous ,, ...	,, very numerous ,,
15th ...	,, very numerous ,, ...	,, very numerous ,,
16th ...	,, very numerous ,, ...	,, swarming ,,
17th ...	,, very numerous ,, ..	,, swarming ,,
1 th ...	Found dead at 5. A.M.	,, swarming ,,
1 th ...	...	Found dead at 6. A.M. ,,

AUTOPSY.—No. I.—Two hours after death.

There are no hæmatozoa visible upon microscopical examination of the heart's blood. All the organs, with the exception of the spleen, present a perfectly healthy appearance. The *spleen* is very much increased in size and is of a dark-red colour. *On section,* the tissues are firm and present no pathological change to the naked eye.

No. II.—*Autopsy* three hours after death.

The heart's blood does not contain any hæmatozoa.

The *spleen* is much increased in size. *Stomach* distended with semi-digested grain, but no lesions apparent.

Remarks.—These two animals, whose blood appeared healthy on microscopical examination, were each inoculated with 0·2 c.c. of blood, containing numerous hæmatozoa, taken from the Jugular Vein of a horse. The time which elapsed between the inoculation and the first appearance of the hæmatozoon in the blood in each case, was five days. No. I succumbed to the disease in eleven days, and No. II in twelve days after inoculation.

The pathological lesions found at the *Post mortem* were, in each instance, confined to the increased size of the *spleen.*

FOWLS.

Fowls.—January 7th, 1891, 2-30 P.M.—Inoculated subcutaneously two male birds (*Gallus domesticus*), each receiving ·2 c. c. of blood containing numerous hæmatozoa taken from the Jugular Vein of Horse No. VI :—

	No. 1.			No. 2.		
Month and Date.	Condition of blood.	Temperature °C.		Condition of blood.	Temperature °C.	
		A.M.	P.M.		A.M.	P.M.
1891.						
January 7 ...	Inoculated 2-30 P.M. ...	...	42·1	Inoculated 2-30 P.M. ...	...	42·3
8 ...	No hæmatozoa ...	42·6	42·3	No hæmatozoa ...	42·3	42·4
9 ...	,, ,, ...	42·4	42·2	,, ,, ...	42·2	41·7
10 ...	,, ,, ...	42·3	42·5	,, ,, ...	42·2	42·6
11 ...	,, ,, ...	42·1	42·1	,, ,, ...	42·8	42·7
12 ...	,, ,, ...	42·5	42·7	,, ,, ...	42·7	42·8
13 ...	,, ,, ...	42·1	42·5	,, ,, ...	42·3	42·5
14 ...	,, ,, ...	42·4	42·5	,, ,, ...	42·5	42·8
15 ...	,, ,, ...	42·7	42·5	,, ,, ...	42·8	42·8
16 ...	,, ,, ...	42·5	42·8	,, ,, ...	42·4	42·5
17 ...	,, ,, ...	42·5	42·5	,, ,, ...	42·4	42·3
18 ...	,, ,, ...	42·2	42·3	,, ,, ...	42·1	42·2
19 ...	,, ,, ...	42·4	42·5	,, ,, ...	42·2	42·6
20 ...	,, ,, ...	42·2	42·5	,, ,, ...	42·2	42·6
21 ...	,, ,, ...	42·3	42·5	,, ,, ...	42	42·7
22 ...	,, ,, ...	41·8	42·5	,, ,, ...	42·2	42·6
23 ...	,, ,, ...	42·4	42·5	,, ,, ...	42·3	42·6
24 ...	,, ,, ...	42·3	42·6	,, ,, ...	42·5	42·7
25 ...	,, ,, ...	42·2	42·5	,, ,, ...	42·5	42·7
26 ...	,, ,, ...	42·2	42·5	,, ,, ...	42·4	42·7
27 ...	,, ,, ...	42·1	42·6	,, ,, ...	42·2	42·3
28 ...	,, ,, ...	42·5	42·8	,, ,, ...	42·3	42·5
29 ...	,, ,, ...	42·6	42·7	,, ,, ...	42·4	42·6
30 ...	,, ,, ...	42·3	42·5	,, ,, ...	42·3	42·7
31 ...	,, ,, ...	42·2	42·3	,, ,, ...	42·4	42·5
February 1 ...	,, ,, ...	42·2	42·5	,, ,, ...	42·4	42·4
2 ...	,, ,, ...	42·3	42·5	,, ,, ...	42·2	42·3
3 ...	,, ,, ...	42·1	42·8	,, ,, ...	42·3	42·6
4 ...	,, ,, ...	42·6	42·3	,, ,, ...	42·5	42·5
	Re-inoculated in the Inguinal Region from Horse No. XI ; each bird received ·3 c. c. of blood in which hæmatozoa were numerous.					
5 ...	No hæmatozoa ...	42·2	42·5	No hæmatozoa ...	42·3	42·4
6 ...	,, ,, ...	42	42·3	,, ,, ...	42·4	42·5
7 ...	,, ,, ...	42·2	42·5	,, ,, ...	42·3	42·3
8 ...	,, ,, ...	42·4	42·4	,, ,, ...	42·2	42·3
9 ...	,, ,, ...	42·4	42·5	,, ,, ...	42·3	42·5
10 ...	,, ,, ...	41·9	42·2	,, ,, ...	42·1	42·3
11 ...	,, ,, ...	42	42·3	,, ,, ...	42·2	42·5
12 ...	,, ,, ...	42·1	42·3	,, ,, ...	42·3	42·5
13 ...	,, ,, ...	42·5	42·7	,, ,, ...	42·3	42·5
14 ...	,, ,, ...	42·4	42·6	,, ,, ...	42·2	42·2
15 ...	,, ,, ...	42·3	42·5	,, ,, ...	42·3	42·6
16 ...	,, ,, ...	42·3	42·4	,, ,, ...	42·3	42·5
17 ...	,, ,, ...	42	42·2	,, ,, ...	42·3	42·5
18 ...	,, ,, ...	42·1	42·3	,, ,, ...	42·3	42·6
19 ...	,, ,, ...	42·2	42·4	,, ,, ...	42·3	42·5
20 ...	,, ,, ...	42·4	42·5	,, ,, ...	42·1	42·2
21 ...	,, ,, ...	42·3	42·5	,, ,, ...	42	42·3
22 ...	,, ,, ...	42·3	42·6	,, ,, ...	42·1	42·2
23 ...	,, ,, ...	42·3	42·6	,, ,, ...	42·3	42·4
24 ...	,, ,, ...	42	42·2	,, ,, ...	42·1	42·3
25 ...	,, ,, ...	42	...	,, ,, ...	42	...
June 12 ...	2 P.M.—Re-inoculated both the above fowls in the wattle, each receiving ·1 c. c. of blood taken from the heart of Horse No. XIII 10 hours after death, but in whose blood the hæmatozoon was swarming just previous to death.					
13 ...	No hæmatozoa ...	43·1	43·4	No hæmatozoa ...	42·9	43.1
14 ...	,, ,, ...	43·2	43	,, ,, ...	42·7	42·5
15 ...	,, ,, ...	42·3	42·5	,, ,, ...	41·8	42·4
16 ...	,, ,, ...	41·7	42·8	,, ,, ...	42	42·7
17 ...	,, ,, ...	42·6	42·9	,, ,, ...	42·4	42·8
18 ..	,, ,, ...	42·6	42·8	,, ,, ...	42·5	42·7
19 ...	,, ,, ...	42·5	42·9	,, ,, ...	42·5	42·6
20 ...	,, ,, ...	42·6	42·3	,, ,, ...	42·4	42·3
21 ...	,, ,, ...	42·5	42·2	,, ,, ...	42·3	41·6
22 ...	,, ,, ...	41·4	41·6	,, ,, ...	41·7	41·8
23 ...	,, ,, ...	41·7	41·7	,, ,, ...	41·8	42
24 ...	,, ,, ...	41·8	41·8	,, ,, ...	42·1	42·1
25 ...	,, ,, ...	42·1	42	,, ,, ...	42	42·1
26 ...	,, ,, ...	41·6	42·8	,, ,, ...	41·7	42
27 ...	,, ,, ...	42	42·2	,, ,, ...	42·1	42·1
28 ...	,, ,, ...	41·7	42·3	,, ,, ...	41·6	41·7
29 ...	,, ,, ..	41·5	42·1	,, ,, ...	41·6	42
30 ...	,, ,, ...	42·2	42·1	,, ,, ...	42·1	42
July 1 ...	,, ,, ...	41·8	42·3	,, ,, ...	41·8	42·1
2 ...	,, ,, ...	42·1	42	,, ,, ...	42	42·1
3 ..	,, ,, ...	41·8	42·2	,, ,, ...	42	42·2
4 ...	,, ,, ...	42·1	42·2	,, ,, ...	42	42·2
5 ...	,, ,, ...	42·1	41·7	,, ,, ...	42	42·2
6 ..	,, ,, ...	41·5	41·8	,, ,, ...	42·1	42·1
7 ...	,, ,, ...	41·8	41·7	,, ,, ...	41·6	41·7
8 ...	,, ,, ...	42·1	42·1	,, ,, ...	41·5	41·6
9 ...	,, ,, ...	41·6	...	,, ,, ...	41·5	...
		Negative results.				

PIGEONS.

January 7th, 1891, 2-30 P.M.—Inoculated subcutaneously in the Inguinal Regions, two pigeons, each with ·2 c.c. of blood containing numerous hæmatozoa, taken from the Jugular Vein of Horse No. VI.

No. 1 Male. *No. 2 Female.*

Month and Date.	Condition of blood.	Temperature °C.		Condition of blood.	Temperature °C.	
		A.M.	P. M.		A.M.	P.M.
January 7th	Inoculated	...	41	Inoculated	...	41·5
8th	No hæmatozoa	41·3	41·2	No hæmatozoa	41·6	41·8
9th	"	40·6	40·5	"	41·2	40·9
10th	"	40·6	41	"	41·1	41·4
11th	"	41·2	41·3	"	41·8	41·9
12th	"	39·7	40·3	"	40·7	40·9
13th	"	41·3	41·4	"	40·8	41·9
14th	"	40·7	41·6	"	41·2	41·8
15th	"	41·2	41·6	"	40·8	41·8
16th	"	40·6	41·5	"	41·5	41·8
17th	"	41·5	40·6	"	41·8	41·5
18th	"	40·3	40·5	"	41·3	41·4
19th	"	41·2	40·8	"	41·3	41·3
20th	"	40·6	41·2	"	41	41·5
21st	"	40·8	41·3	"	41·1	41·8
22nd	"	41	41·3	"	41·7	41·5
23rd	"	40·6	40·9	"	41	41·5
24th	"	40·8	40·9	"	41·2	41·4
25th	"	40·5	40·8	"	41·4	41·4
26th	"	40·5	41·6	"	41·1	41·8
27th	"	40·7	40·9	"	40·6	41·7
28th	"	41·2	40·7	"	41·8	41·2
29th	"	40·8	40·5	"	41·3	41·9
30th	"	40·8	40·8	"	41·7	41·6
31st	"	40·6	40·8	"	40·9	41·5
February 1st	"	40·7	40·5	"	41·3	41·1
2nd	"	40·4	40·5	"	41	41·4
3rd	"	40·7	40·7	"	40·6	41·6
4th	"	40·6	41·2	"	41·4	41·8
5th	"	40·8	41·3	"	41·6	41·8
6th	"	40·6	40·7	"	41·6	41·8
7th	"	40·8	41·3	"	41·3	41·5
8th	"	41·2	41·4	"	41·4	41·7
9th	"	40·9	41·5	"	41·7	41·8
10th	"	41·1	41·4	"	41·4	41·7
11th	"	41·3	41·3	"	41·3	41·5
12th	"	40·9	40·9	"	41·4	41·7
13th	"	40·6	41·4	"	41·2	41·6
14th	"	41	41·4	"	41·5	41·6
15th	"	41·2	41·4	"	40·5	41·7
16th	"	41·2	41·1	"	41·5	41·4
17th	"	41·6	41·4	"	41·7	41·8
18th	"	41·2	41·5	"	41·5	41·8
19th	"	41·1	41·3	"	41·5	41·7
20th	"	41·5	41·5	"	40·3	41·3
21st	"	41·2	41·4	"	41·2	41·6
22nd	"	41·1	41·3	"	41·4	41·6
23rd	"	41·1	41·4	"	41·3	41·7
24th	"	41·1	41·4	"	41·3	41·7
*25th	"	41·1	...	"	41·4	...

* The taking of the temperature, and microscopical examination of the blood were discontinued on this date. Negative results.

APPENDIX VIII.

INOCULATION OF

SMALL ANIMALS WITH

Urine of Horse.
Pericardial Fluid.
Fluid from the Lateral Ventricles.

SUBCUTANEOUS INOCULATION OF SMALL ANIMALS WITH THE URINE OF A HORSE IN AN ADVANCED STAGE OF 'SURRA.'

These experiments were undertaken with a double object:—

(i). In order to observe the effect, if any, produced by the toxic constituents in the urine of horses in an advanced stage of Surra, and presenting the hæmatozoon in large numbers in the blood, at the time when the urine was voided.

(ii). To ascertain in the event of the animal surviving the toxic effects of the injected fluid, whether any mature or immature forms of the hæmatozoon are excreted in the urine, and if so, whether they are capable of reproducing the disease, by the inoculation of it into another animal.

Consequently on October 14th, 1891, a Guinea-pig and a rabbit were selected, and their blood submitted to microscopical examination previous to the subcutaneous inoculation of the fluid. In the case of each animal, the blood was found to be healthy.

14th October.—A Guinea-pig No. 1, full grown, temperature 1-20 P.M. 40·4°C., weight 988·0 grammes, was subcutaneously inoculated at 1-45 P.M. with 5 C.C. of urine slightly acid in re-action, Sp. Gr. 1,014, and containing a few granular casts, and a trace of albumen. This was a sample of collected urine voided during the previous twenty-four hours by Horse No. XXXVIII. on the 50th day after inoculation with horse Surra blood. The hæmatozoa were swarming in the blood of the horse during the period that the urine was being collected.

This animal was carefully watched from 2 P.M. until 6 P.M., but with the exception of the respirations being increased in number immediately after the injection of the urine, and lasting so until 3-10 P.M., when the breathing became tranquil, no toxic symptoms presented themselves. Temperature P.M. 39·8°C.

15th.—Temperature A.M. 39·3°C. At noon, a second subcutaneous injection of 5 C.C. was made. The urine was slightly acid, Sp. Gr. 1,016, and contained a few granular casts and a trace of albumen. No symptoms followed. Temperature P.M. 40°C. No hæmatozoa in the blood.

16th.—	Temperature	A.M.	39°C.	P.M.	39·8°C.	Hæmatozoa	absent from	the blood.
17th	”	”	39·3°C.	„	39·7°C.	”	”	”
18th	”	”	39·1°C.	„	39·7°C.	”	”	”
19th	”	”	39·2°C.	„	39·4°C.	”	”	”
20th	”	”	39°C.	„	39·5°C.	”	”	”
21st	”	”	38·6°C.	„	39·3°C.	”	”	”
22nd	”	”	38·2°C.	„	39·2°C.	”	”	”
23rd	”	”	38·5°C.	„	39·4°C.	”	”	”
24th	”	”	38·7°C.	„	39·2°C.	”	”	”
25th	”	”	38·5°C.	„	39·4°C.	”	”	”
26th	”	”	38°C.	„	39·1°C.	”	”	”
27th	”	”	38·3°C.	„	39·2°C.	”	”	”

30th September, 1892.—The animal is still alive and healthy.

RABBIT.—This is a white coloured animal with pink eyes. Weight 2,145 grammes.

14th October, 1891, 1-20 P.M.—Temperature 39·4°C.

2 P.M.—Inoculated subcutaneously with 10 C.C. of urine from the same source as that used in the previous experiment.

2-10 P.M.—The pulse and respirations are accelerated, and a few minutes later, the pupils became slightly contracted. These conditions at 2-26 P.M. were more aggravated, and lasted until 2-40 P.M., when the pupils began to dilate again and the breathing became less frequent. At 3-35, the respirations had fallen in number per minute, to just one half of what they were at 2-26. At 4 P.M. the animal appeared to be in the same condition as observed previous to the inoculation. Temperature P.M. 39°C.

15th October.—Temperature A.M. 39·3°C. At noon, a second subcutaneous injection of 10 C.C. of urine from the same horse was administered with less result than observed after the previous one. Temperature P.M. 39·6°C. No hæmatozoa in the blood.

16th.—	Temperature	A.M.	39·2°C.	P.M.	39·7°C.	No hæmatozoa	in the	blood.
17th	”	”	39°C.	”	39·5°C.	”	”	”
18th	”	”	39·1°C.	”	39·6°C.	”	”	”
19th	”	”	39·3°C.	”	39·5°C.	”	”	”
20th	”	”	39·2°C.	”	39·3°C.	”	”	”
21st	”	”	38·6°C.	”	39·5°C.	”	”	”
22nd	”	”	38·8°C.	”	39·5°C.	”	”	”
23rd	”	”	38·6°C.	”	39·4°C.	”	”	”
24th	”	”	39°C.	”	39·3°C.	”	”	”
25th	”	”	38·8°C.	”	39·5°C.	”	”	”
26th	”	”	39·1°C.	”	39·4°C.	”	”	”
27th	”	”	39·2°C.	”	39·4°C.	”	”	”

30th September, 1892.—The animal is still alive and healthy.

Remarks.

(i). It will thus be observed from the above experiments on a Guinea-pig and a rabbit that during the evolution of the bio-chemical morbid process (Surra), no toxic principles have been found in the urine at an advanced period of the disease.

(ii). That during a period of fourteen days after two injections of considerable quantities of the suspected urine, no hæmatozoa have been discovered in the blood of the inoculated animals, and that after a period of eleven months, during which time the subjects of inoculation have been under continual observation, they still remain alive and healthy.

(iii). Hence, that if the hæmatozoa are excreted through the agency of the kidneys, it would appear to be of no great clinical importance, as they must be either dead or incapable of reproduction.

INOCULATION OF GUINEA-PIGS WITH PERICARDIAL FLUID.

28th December, 1891.—Inoculated subcutaneously two Guinea-pigs each with 1·0 c.c. of pericardial fluid taken from the pericardial sac of Horse No. LVI. thirteen-hours after death.

No. I. No. II.

Month and Date.	Condition of blood.	Temperature °C.		Condition of blood.	Temperature °C.	
		A.M.	P.M.		A.M.	P.M.
December 28th...	Hæmatozoa absent ...	...	39·7	Hæmatozoa absent ...	...	39·8
29th...	,, ,, ...	39·4	39·8	,, ,, ...	39·6	40·6
30th...	,, ,, ...	38·3	39·7	,, ,, ...	39	39·8
31st...	,, ,, ...	38·6	39·8	,, ,, ...	39·4	40·1
January 1st ...	,, ,, ...	38·7	39·7	,, ,, ..	39·1	40
2nd...	,, ,, ...	38·7	39·7	,, ,, ...	39	39·6
3rd...	,, ,, ...	38·5	39·7	,, ,, ...	38·6	39·5
4th...	,, ,, ...	39	39·6	,, ,, ...	39·1	39·7
5th...	,, ,, ...	39	39·5	,, ,, ...	39·3	39·5
6th..	,, ,, ...	38·4	40·1	,, ,, ...	38·7	39·5
7th...	,, few	38·6	39·1	,, few	38·7	39
8th...	,, numerous ...	39·3	40	,, numerous ...	38·6	39·4
9th...	,, very numerous ...	39·2	40·2	,, very numerous...	38·3	39·3
10th...	,, ,, ,, ...	38·6	40·1	,, swarming ...	38·3	39·6
11th...	,, swarming ...	39·1	40	,, ,, ...	38·4	39·4
12th...	,, ,, ...	39·3	40	,, ,, ...	39	39·1
13th...	,, very numerous ...	39·4	39·5	,, ,, ...	38·4	39·4
14th...	,, numerous ...	39·1	39·6	,, very numerous...	38·7	39·5
15th...	,, few	39·1	39·4	,, numerous ...	39	39·4
16th...	,, very numerous ...	39	40·3	,, few	39	39·4
17th...	,, ,, ,, ...	39	39·2	,, absent	38·7	39·4
18th...	,, ,, ,, ...	39·1	40	,, ,, ...	38·5	39·4
19th...	,, numerous ...	39	39·5	,, few	38·3	39·5
20th...	,, ,, ...	38·5	39·4	,, numerous ...	38·6	39·6
21st...	,, ,, ...	39	39	,, very numerous...	39·2	39·4
22nd...	,, swarming ...	39·1	39·7	,, swarming ...	39	40·6
23rd...	,, ,, ...	39	39·8	,, ,, ...	40	40·2
24th...	,, ,, ...	38·8	39·9	,, few	39·4	39·2
25th...	,, ,, ...	39·2	39·8	,, ,, ...	39	39·4
26th...	,, numerous ...	38·7	39·1	,, ,, ...	38·8	39·5
27th...	,, ,, ...	38·6	39·4	,, ,, ...	38·7	39·4
28th..	,, few	39·7	39	,, ,, ...	38·6	39·5
29th...	,, ,, ...	38·5	39·3	,, numerous ...	38·7	39·7
30th...	,, numerous ...	38·5	39·4	,, very numerous...	38·8	39·5
31st ...	,, very numerous ...	39·1	39·4	,, swarming ...	38·8	39·4
February 1st ...	,, swarming ...	39·1	39·6	,, ,, ...	39·2	39·5
2nd...	,, ,, ...	39·4	39·4	,, ,, ...	39·4	39·6
3rd...	,, ,, ...	39·1	39·4	,, ,, ...	39·2	39·5
4th...	,, ,, ...	38·6	39·5	,, ,, ...	38·6	39·6
5th...	,, very numerous ...	38·6	39·6	,, ,, ...	38·7	39·5
6th...	,, ,, ,, ...	38·6	32·4	,, ,, ...	39·1	39·6
7th...	,, ,, ,, ...	38·8	39·5	,, ,, ...	39·1	39·6
8th...	,, numerous ...	39·2	39·3	,, ,, ...	39·2	39·5
9th...	,, ,, ...	38·4	39·5	,, ,, ...	39·2	39·7
10th...	,, few	38·8	39·3	,, ,, ...	38·8	39·6
11th...	,, absent	38·7	39·2	,, ,, ...	39·4	39·5
12th...	,, ,, ...	38·7	39·4	,, ,, ...	39·6	39·6
13th...	,, few	39·3	39·4	,, ,, ...	39·5	39·5
14th...	,, numerous ...	39	39·3	,, ,, ...	39·2	39·5
15th...	,, absent	38·8	39·2	,, ,, ...	39·3	39·4
16th ..	,, ,, ...	38·5	39·4	,, ,, ...	38·8	39·5
17th...	,, few	39·2	39·2	,, very numerous...	39	39·3
18th...	,, ,, ...	38·6	39·5	,, numerous ...	38·5	39·5
19th...	,, ,, ...	38·7	39·2	,, few	38·5	39·3
20th...	,, ,, ...	39	39·1	,, ,, ...	39·1	39·3
21st...	,, ,, ...	38·4	39·1	,, ,, ...	38·2	39·3
22nd	,, absent	38·5	39·2	,, numerous ...	38·2	39·3
23rd...	,, few	38·2	39·3	Death.		
24th...	,, numerous ...	38·1	39·2			
25th...	Death.					

These two Guinea-pigs were each inoculated subcutaneously with 1 c.c. of fluid taken from the pericardial sac of a horse thirteen hours after death.

The period which elapsed between the inoculation and the first appearance of the hæmatozoon in the blood, was ten days, in each case respectively.

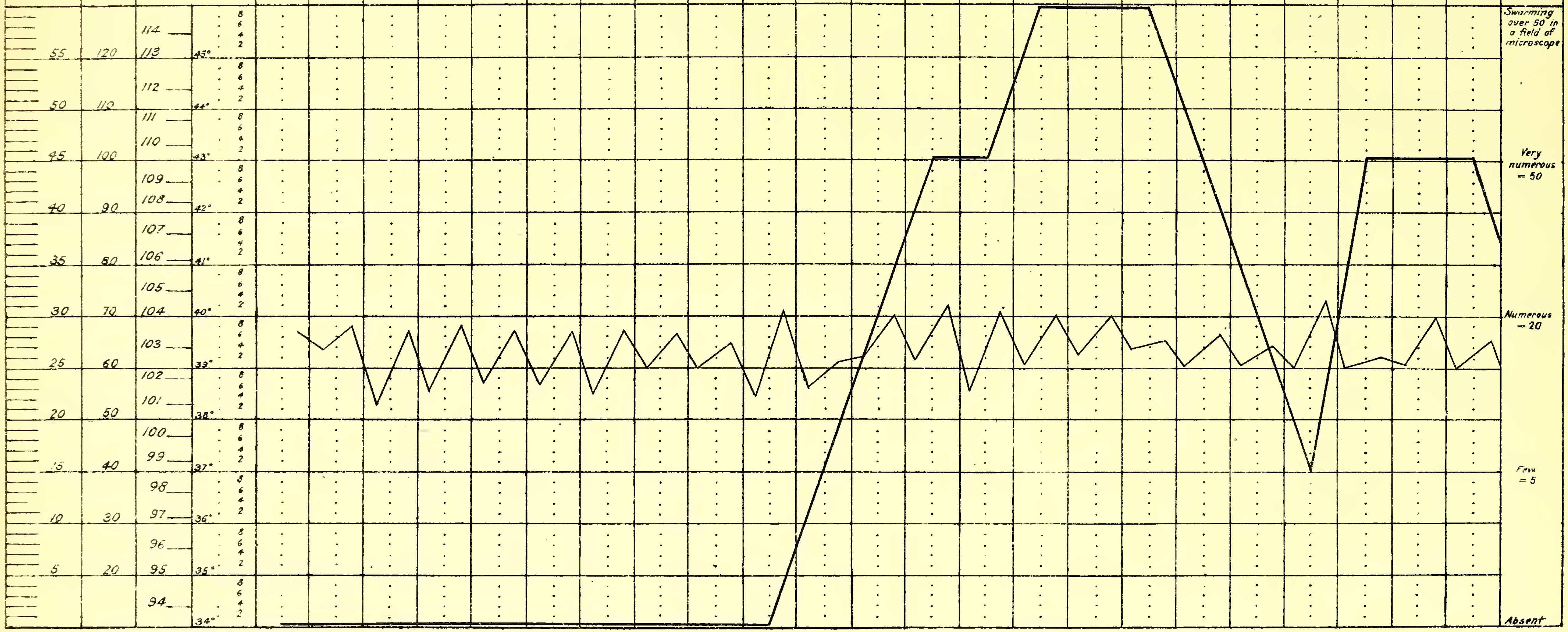
The organisms in the two animals continued to be present in the blood with very few exceptions until the time of death which took place in No. I after 49, and in No. II. after 47 days.

RECORDS of TEMPERATURE, PULSE and RESPIRATION.

Guinea Pig No. I Inoculated Subcutaneously with ·5 cc of pericardial fluid from Horse No. LVI. Age _____ Sex _____ Colour _____

Disease _____ Date of Inoc: Dec: 28th 1891 _____ Result Death _____ Date of Result Feby 25·92 _____ Register No. I. _____

Dates of Observation.	Dec./91 28	29	30	31	Jany 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	Record of Organisms in Blood.
Days of Disease											1	2	3	4	5	6	7	8	9	10	11	12	13	
Organisms in Blood	—	—	—	—	—	—	—	—	—	—	F	N	VN	VN	S	S	S	VN	N	F	VN	VN	VN	
Respiration per minute / Pulse per minute / Temperature F C	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	



(S 415)

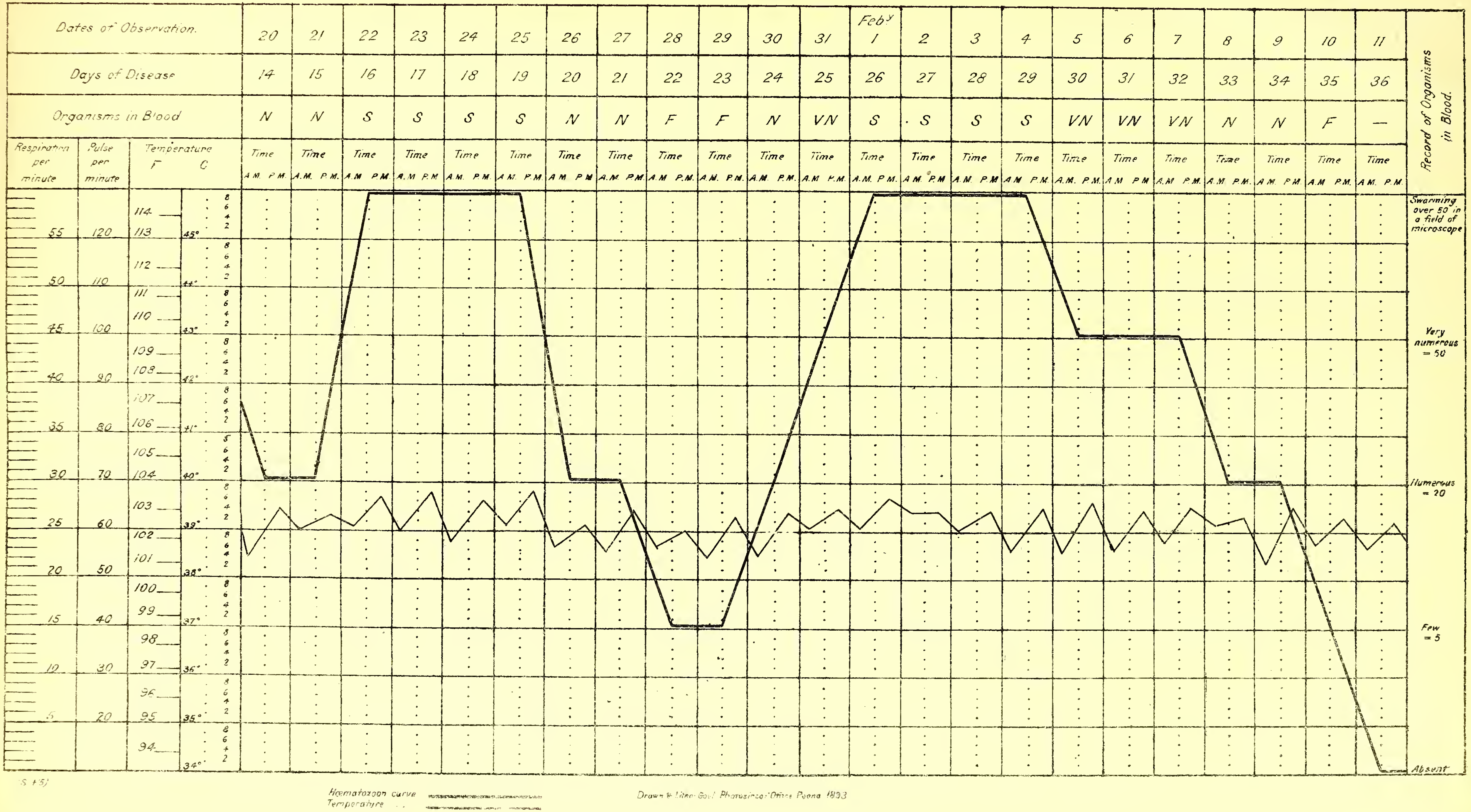
Drawn & Litho: Govt Photozinco: Office Poona 1893

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age ______ Sex ______ Colour ______

Disease ______ Date of ______ Result ______ Date of Result ______ Register No. ______



Dates of Observation.	20	21	22	23	24	25	26	27	28	29	30	31	Feby. 1	2	3	4	5	6	7	8	9	10	11
Days of Disease	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Organisms in Blood	N	N	S	S	S	S	N	N	F	F	N	VN	S	S	S	S	VN	VN	VN	N	N	F	—

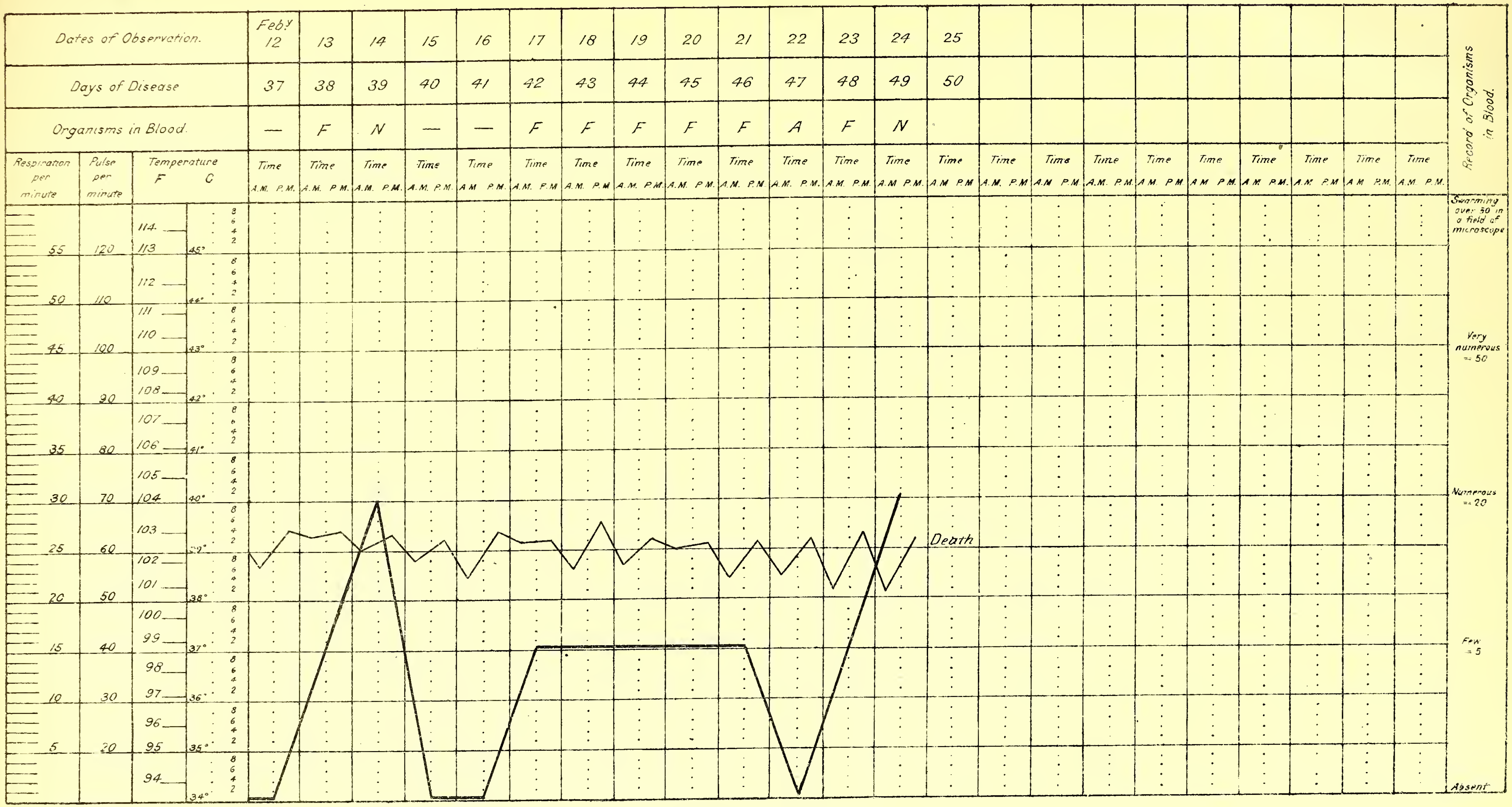
(S + 5)

Drawn & Litho: Govt. Photozinco: Office Poona 1893

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age ________ Sex ________ Colour ________

Disease ________ Date of ________ Result ________ Date of Result ________ Register No. ________



(S 4.5)

Hæmatozoon curve
Temperature ....

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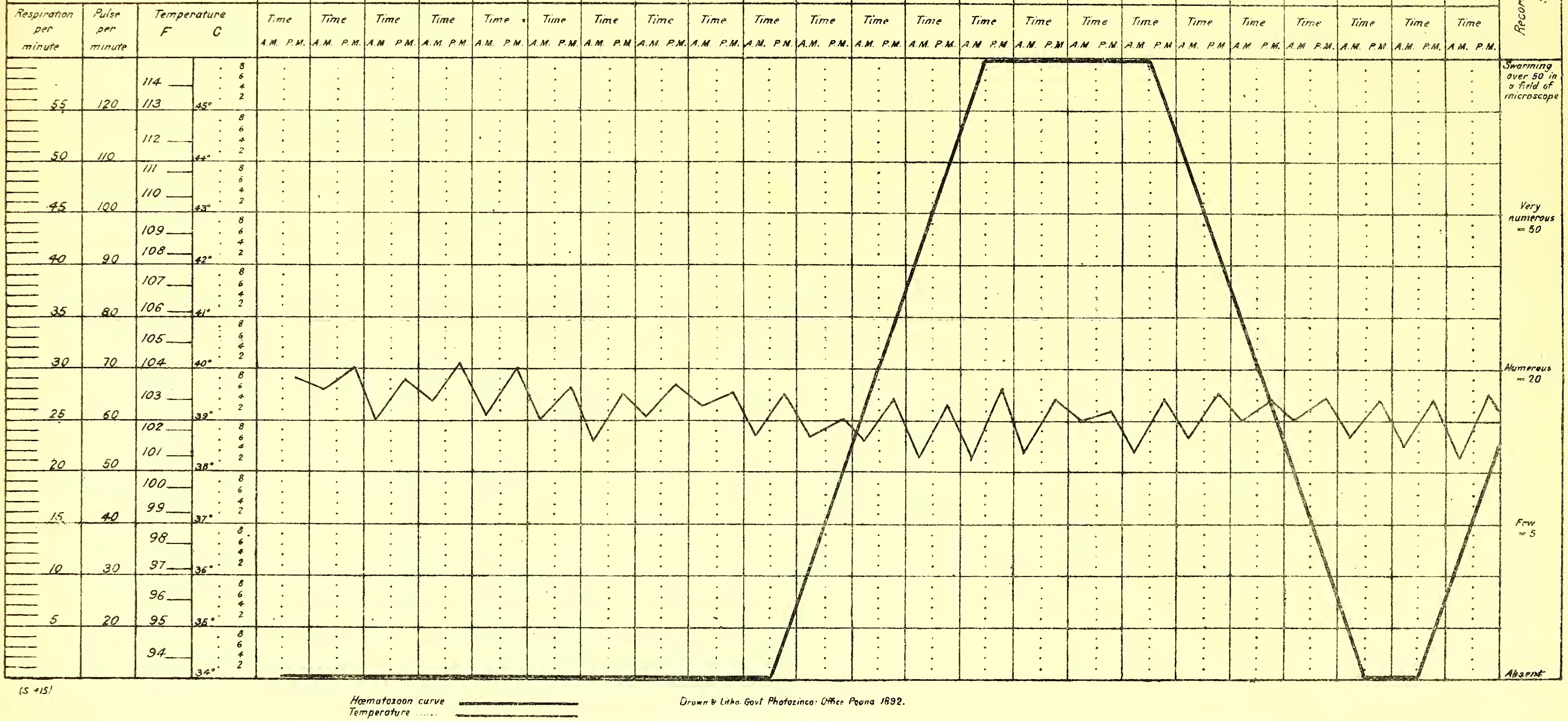
G. Pig Nº(ij) Inoculated Subcutaneously with ·5cc of pericardial fluid from Horse No. LVI. Age Sex

G. Pig No (ij). Inoculated Subcutaneously with ·5cc of pericardial fluid from Horse No. LVI. Age Sex Colour

Disease, "Surra" Date of Inoculation, Dec: 28. 1891. Result, Death. Date of Result, 23. Feby 92. Register No. II.

Dates of Observation.	Dec: 28	29	30	31	Jany 92 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Days of Disease											1	2	3	4	5	6	7	8	9	10	11	12	13
Organisms in Blood.	—	—	—	—	—	—	—	—	—	—	F	N	VN	S	S	S	S	VN	N	F	—	—	F



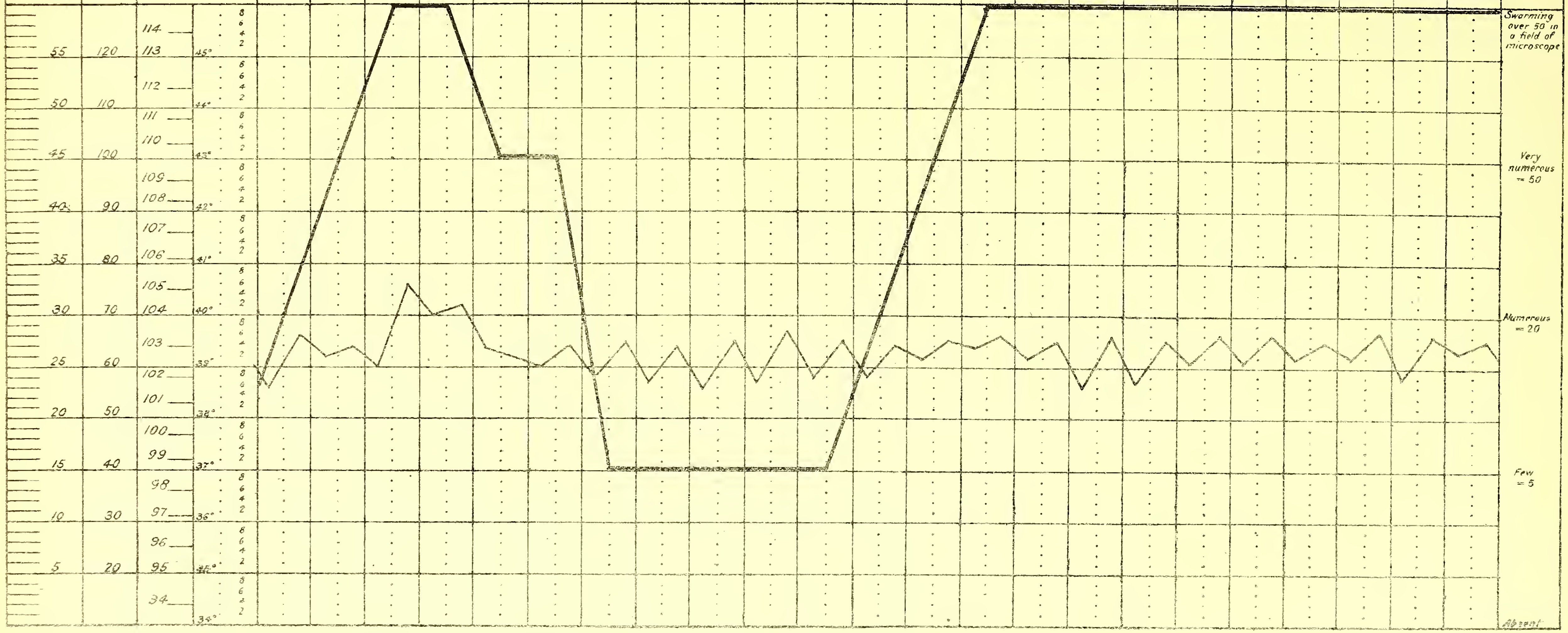
(S +15)

Drawn & Litho. Govt Photozinco: Office Poona 1892.

Age ___ Sex ___ Colour ___

Disease ___ Date of ___ Result ___ Date of Result ___ Register No. ___

Dates of Observation.	Jan.y 20	21	22	23	24	25	26	27	28	29	30	31	Feb.y 1	2	3	4	5	6	7	8	9	10	11
Days of Disease	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Organisms in Blood.	N	VN	S	S	VN	VN	F	F	F	F	F	N	VN	S	S	S	S	S	S	S	S	S	S
Respiration per minute / Pulse per minute / Temperature F C	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.	Time A.M. P.M.



(S 415)

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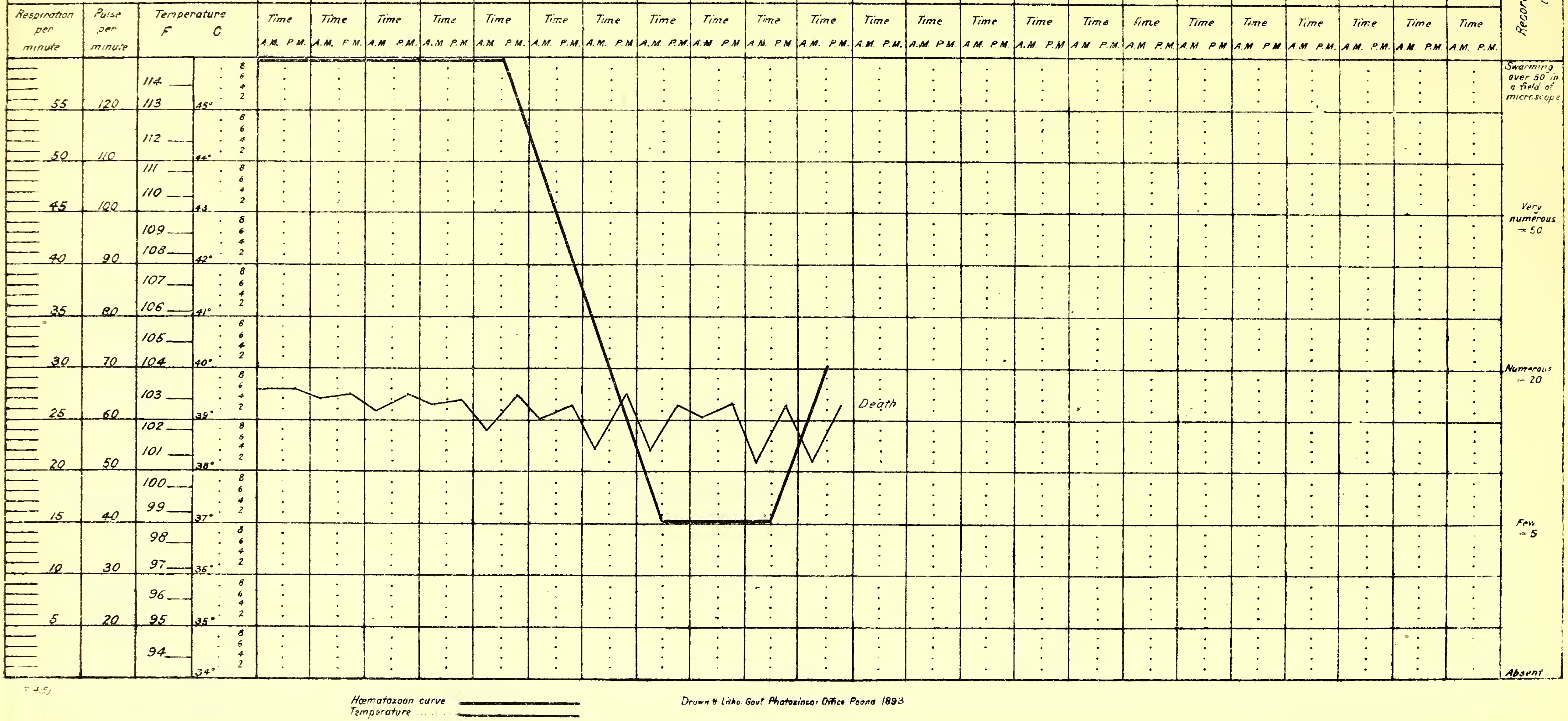
RECORDS OF TEMPERATURE, PULSE AND RESPIRATION

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age ______ Sex ______ Colour ______

Disease ______ Date of ______ Result ______ Date of Result ______ Register No. ______

Dates of Observation.	Feb.y 12	13	14	15	16	17	18	19	20	21	22	23
Days of Disease	37	38	39	40	41	42	43	44	45	46	47	48
Organisms in Blood.	S	S	S	S	S	VN	N	F	F	F	N	



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INOCULATION WITH FLUID FROM THE LATERAL VENTRICLES.

Guinea-Pig.

15*th August*, 1891.—Inoculated subcutaneously with ·5 C. C. of clear fluid removed from the lateral ventricles of the brain of Horse No. XXXIV, two hours after death.

Temperature P.M. 38·6°C.

16*th*	*August.*—	Temperature	A.M.	38·3°C.	P.M.	38·7°C.	Hæmatozoa	absent	from the blood.
17*th*	,,	,,	,,	38·5°C.	,,	39°C.	,,	,,	,,
18*th*	,,	,,	,,	38·6°C.	,,	39·3°C.	,,	,,	,,
19*th*	,,	,,	,,	39°C.	,,	39°C.	,,	,,	,,
20*th*	,,	,,	,,	38·5°C.	,,	39·3°C.	,,	,,	,,
21*st*	,,	,,	,,	39·5°C.	,,	39·8°C.	,,	,,	,,
22*nd*	,,	,,	,,	39·7°C.	,,	40°C.	,,	,,	,,
23*rd*	,,	,,	,,	39·6°C.	,,	39·5°C.	,,	,,	,,
24*th*	,,	,,	,,	39·1°C.	,,	39·7°C.	,,	,,	,,
25*th*	,,	,,	,,	39·5°C.	,,	39·6°C.	,,	,,	,,
26*th*	,,	,,	,,	38·7°C.	,,	39·5°C.	,,	numerous	,,
27*th*	,,	,,	,,	39·4°C.	,,	39·7°C.	,,	very numerous	,,
28*th*	,,	,,	,,	39·5°C.	,,	39·5°C.	,,	,,	,,
29*th*	,,	,,	,,	39·4°C.	,,	39·7°C.	,,	swarming	,,
30*th*	,,	,,	,,	39·5°C.	,,	39·6°C.	,,	,,	,,
31*st*	,,	,,	,,	39·4°C.	,,	39·7°C.	,,	,,	,,
1*st*	*September*	,,	,,	39·4°C.	,,	39·7°C.	,,	,,	,,
2*nd*	,,	,,	,,	39·5°C.	,,	39·6°C.	,,	numerous	,,
3*rd*	,,	,,	,,	39°C.	,,	39·1°C.	,,	few in	,,
4*th*	,,	,,	,,	39·8°C.	,,	39·5°C.	,,	,,	,,
5*th*	,,	,,	,,	39·1°C.	,,	39·4°C.	,,	numerous	,,
6*th*	,,	,,	,,	39·2°C.	,,	39·3°C.	,,	swarming	,,
7*th*	,,	,,	,,	39·1°C.	,,	39·3°C.	,,	,,	,,
8*th*	,,	,,	,,	39°C.	,,	39·3°C.	,,	numerous	,,
9*th*	,,	,,	,,	39·1°C.	,,	39·4°C.	,,	very numerous	,,
10*th*	,,	,,	,,	39·4°C.	,,	39·6°C.	,,	,,	,,
11*th*	,,	,,	,,	39·7°C.	,,	39·8°C.	,,	swarming	,,
12*th*	,,	,,	,,	39·6°C.	,,	39·7°C.	,,	,,	,,
13*th*	,,	,,	,,	39·5°C.	,,	39·6°C.	,,	,,	,,
14*th*	,,	,,	,,	39·4°C.	,,	40°C.	,,	,,	,,
15*th*	,,	,,	,,	39·8°C.	,,	40°C.	,,	,,	,,
16*th*	,,	,,	,,	39·7°C.	,,	39·6°C.	,,	,,	,,
17*th*	,,	,,	,,	39·3°C.	,,	39·7°C.	,,	,,	,,
18*th*	,,	,,	,,	39·5°C.	,,	39·7°C.	,,	,,	,,
19*th*	,,	,,	,,	39·2°C.	,,	39·5°C.	,,	,,	,,
20*th*	,,	,,	,,	39·8°C.	,,	39·7°C.	,,	,,	,,
21*st*	,,	,,	,,	39·6°C.	,,	40·2°C.	,,	,,	,,
22*nd*	,,	,,	,,	40·2°C.	,,	40·2°C.	,,	,,	,,
23*rd*	,,	,,	,,	39·7°C.	,,	39·8°C.	,,	,,	,,
24*th*	,,	,,	,,	40°C.	,,	40·3°C.	,,	,,	,,
25*th*	,,	,,	,,	40·2°C.	,,	40·1°C.	,,	,,	,,
26*th*	,,	,,	,,	40°C.	,,	40·2°C.	,,	very numerous	,,
27*th*	,,	,,	,,	39·6°C.	,,	39·7°C.	,,	numerous	,,
28*th*	,,	,,	,,	40°C.	,,	39·8°C.	,,	few ,,	,,
29*th*	,,	,,	,,	40·1°C.	,,	40°C.	,,	few ,,	,,
30*th*	,,	,,	,,	39·7°C.	,,	39·8°C.	,,	absent ,,	,,
1*st*	*October*	,,	,,	39·4°C.	,,	39·7°C.	,,	,,	,,
2*nd*	,,	,,	,,	39·5°C.	,,	39·8°C.	,,	,,	,,
3*rd*	,,	,,	,,	40·2°C.	,,	39·6°C.	,,	,,	,,
4*th*	,,	,,	,,	40·3°C.	,,	40·5°C.	,,	,,	,,
5*th*	,,	,,	,,	40·2°C.	,,	40·2°C.	,,	,,	,,

6th	*October.*—	Temperature	A.M.	39·8°C.	P.M.	40°C.	Hæmatozoa	absent	from the	blood.
7th	„	„	„	40·4°C.	„	40·6°C.	„	few	„	„
8th	„	„	„	41·2°C.	„	41·1°C.	„		„	„
9th	„	„	„	40·6°C.	„	41°C.	„	numerous		„
10th	„	„	„	40·4°C.	„	40·7°C.	„	absent	„	„
11th	„	„	„	39·4°C.	„	40·1°C.	„		„	„
12th	„	„	„	39·8°C.	„	39·6°C.	„		„	„
13th	„	„	„	39·4°C.	„	39·7°C.	„		„	„
14th	„	„	„	39·4°C.	„	40·2°C.	„	few	„	„
15th	„	„	„	40°C.	„	40·5°C.	„	numerous		„
16th	„	„	„	39·5°C.	„	39·6°C.	„		„	„
17th	„	„	„	39·7°C.	„	40·6°C.	„	very numerous		„
18th	„	„	„	40·4°C.	„	40°C.	„		„	„
19th	„	„	„	Death.						

AUTOPSY.

Lungs.—Consolidation of both anterior lobes.

Spleen.—Large, tissue firm and healthy in appearance.

Heart.—Healthy, no extravasations.

This animal was inoculated subcutaneously with ·5 c.c. of clear fluid, taken from the lateral ventricles of a horse, two hours after death. No hæmatozoa could be detected in the fluid on microscopical examination.

Eleven days elapsed before the hæmatozoon made its first appearance in the blood, and from that time until death, with very few exceptions, it continued to be present.

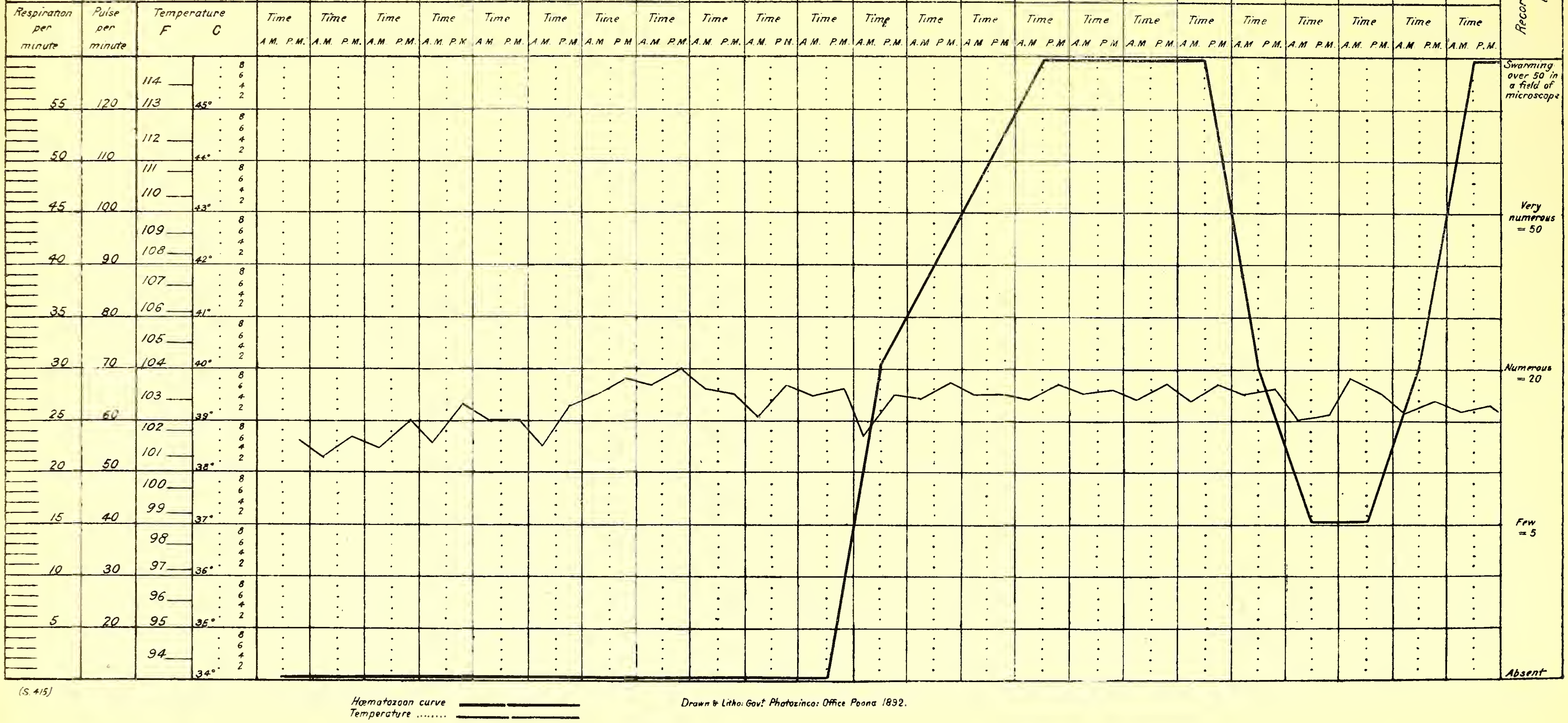
Chart

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Guinea Pig inoculated with "Cerebro Spinal fluid" from Horse No. XXXIV. Age ______ Sex ______ Colour ______

Disease "Surra" ______ Date of Inoc. 15th August 91 ______ Result Death ______ Date of Result 19.10.91 ______ Register No. ______

Dates of Observation	Augt 15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Septr 1	2	3	4	5	6
Days of Disease												1	2	3	4	5	6	7	8	9	10	11	12
Organisms in Blood		—	—	—	—	—	—	—	—	—	—	N	VN	VN	S	S	S	S	N	F	F	N	S.



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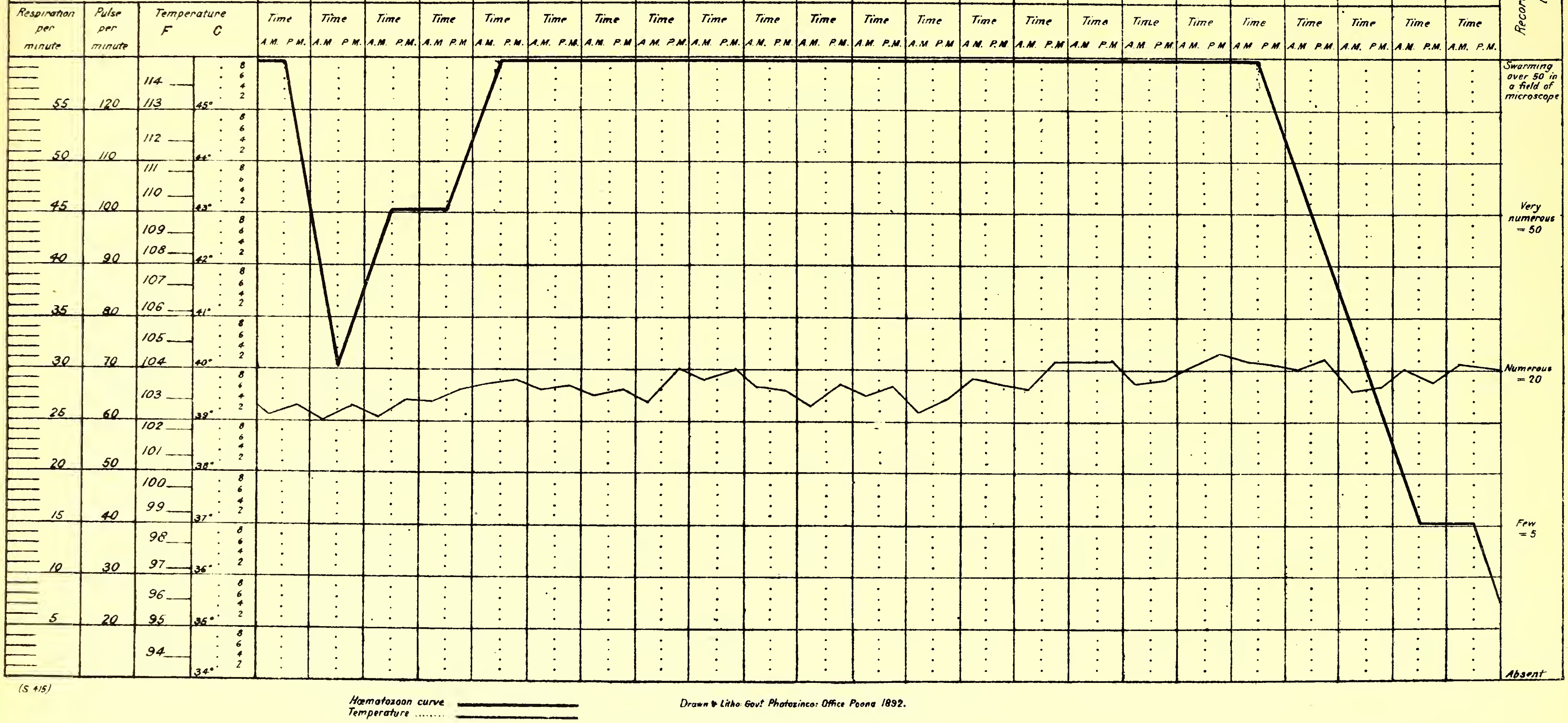
RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

__________ Age ______ Sex ______ Colour ______

Disease ______ Date of ______ Result ______ Date of Result ______ Register No. ______

Dates of Observation.	Sept.r 7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
Days of Disease	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Organisms in Blood.	S	N	VN	VN	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	VN	N	F	F



(S 415)

Drawn & Litho: Govt. Photozinco: Office Poona 1892.

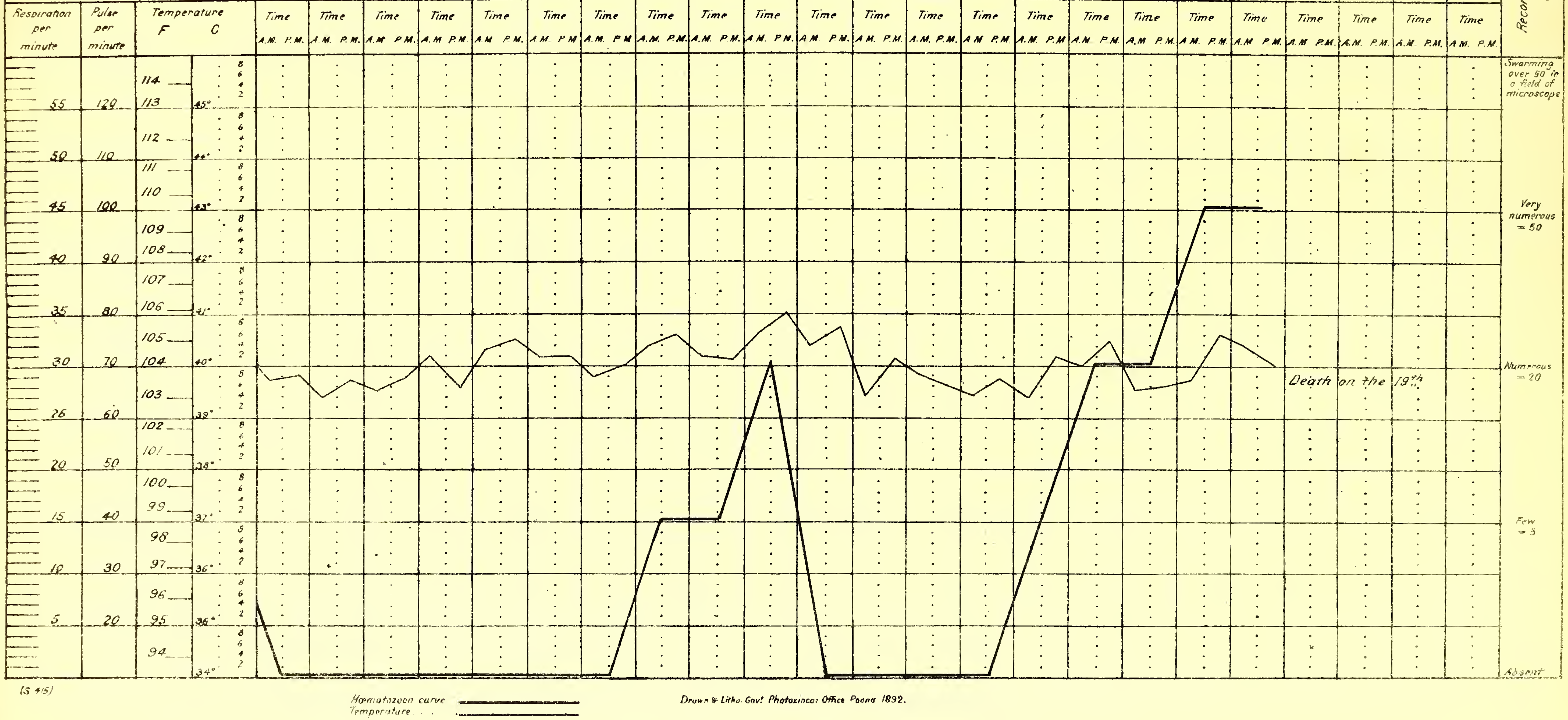
RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

RECORDS OF TEMPERATURE, PULSE AND RESPIRATION.

Age ______ Sex ______ Colour ______

Disease ______ Date of ______ Result ______ Date of Result ______ Register No. ______

Dates of Observation.	Sept.r 30	Oct.r 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19			
Days of Disease	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55			
Organisms in Blood	—	—	—	—	—	—	—	F	F	N	—	—	—	—	F	N	N	VN	VN				



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APPENDIX IX.

EXPERIMENTAL TREATMENT.

Rabbits—Subcutaneous injection of, with filtered Blood Serum (Horse).

Guinea-Pigs— ditto ditto ditto.

Guinea-Pigs—Subcutaneous injection of, with Proteid Substance obtained from the blood of the horse.

Guinea-Pigs—Subcutaneous injection of, with Bull's blood.

RABBITS
SUBCUTANEOUSLY INJECTED WITH FILTERED BLOOD SERUM.

10th December 1890.—Fresh blood containing numerous Surra hæmatozoa was drawn from Horse No. III immediately after death, into sterilized glass vessels and set aside for several hours in order to allow the serum to separate. The serum was then forced through one of M. Pasteur's porcelain filters.

Three rabbits *A*, *B* and *C* were subcutaneously inoculated during a period of three days with varying quantities of serum. A received in all 3 c. c., B 6 c. c. and C 9 c. c.

Month and date.	Rabbit *A*.			Rabbit *B*.			Rabbit *C*.		
	Condition of Blood.	Temperature. °C.		Condition of Blood.	Temperature. °C.		Condition of Blood.	Temperature. °C.	
		A.M.	P.M.		A.M.	P.M.		A.M.	P.M.
1890.									
10th December ...	Injected filtered serum 1c c.	...	39·6	Injected filtered serum, 2c.c...	...	39·4	Injected filtered serum 3c.c.	...	39·2
11th ,, ...	,, 1c.c.	39·1	40	,, 2c.c...	39·6	40·3	,, ,, 3c.c.	39·3	39·3
12th ,, ...	,, 1c c.	40·1	39·7	,, 2c.c...	39·9	39·4	,, ,, 3c.c.	40·1	39·9
The three animals were each inoculated with ·2 c.c. of blood containing numerous hæmatozoa, taken from No. II Guinea-Pig of November 2nd 1890, as well as a fourth as a control experiment.									
13th ,, ...	Hæmatozoa absent.	40	39 8	Hæmatozoa absent.	39·6	39·4	Hæmatozoa absent.	40·1	39·9
14th ,, ...	,, ,, ..	39·1	39·4	,, ,, .	39·1	39·6	,, ,, .	40	39·8
15th ,, ...	,, ,, ...	39·4	39 7	,, ,, .	39 7	39·5	,, ,, .	40	39·8
16th ,, ...	,, ,, ...	39·8	40	,, ,, .	39·4	39·8	,, ,, .	39·9	40·1
17th ,, ...	,, ,, ...	39·8	40	,, ,, .	39·7	39·1	,, ,, ,	40	40·3
18th ,, ...	,, few ...	40·5	40 1	,, few .	39·3	39·5	,, few ...	40·7	40·4
19th ,, ..	,, ,, ...	40 2	40·1	,, absent.	40·2	40·3	,, absent.	39·9	39·7
20th ,, ...	,, ,, ...	39 8	40·2	,, ,, .	39·7	40 1	,, few ...	40	40
21st ,, ...	,, absent	40·4	40·9	,, ,, .	40·3	40·8	,, absent.	39·8	40·6
22nd ,, ...	,, ,, ...	40·5	40·3	,, ,, .	40·3	40	,, ,, ...	40·8	40·2
23rd ,, ...	,, ,, ...	41·1	40·8	,, ,, .	40·4	40·1	,, few ...	40·9	40·8
24th , ...	,, few ...	40·7	40·6	,, ,, .	40·5	40·8	,, absent	40·9	41
25th ,, ..	,, absent .	40·5	40·4	,, ,, .	40·7	40·9	,, ,, ...	40·8	41
26th ,, ...	,, ,, ...	40·8	40·9	,, few .	41·2	41·4	,, ,, ...	40·6	40·8
27th ,, ...	,, few .	40·6	40·4	,, absent.	40·9	41·1	,, ,, ...	40·7	40·9
28th ,, ...	,, absent .	40·1	40·3	,, ,, .	40·9	41·2	,, ,, ...	40·7	41·1
29th ,, ...	,, ,, ...	40·5	40·6	,, numerous.	40·6	40·7	,, ,, ...	39·9	39·9
30th ,, ...	,, ,, .	40 9	40·9	,, absent.	40·7	40 9	,, ,, ...	40·1	40·5
31st ,, ...	,, ,, ...	39·9	39·8	,, ,, .	40·7	40	,, ,, ...	40·2	40·1
1st January 1891.	,, ,, ...	39 6	41	,, ,, .	39·9	40 6	,, ,, ...	40	41·1
2nd ,, ...	Ear serum absent, blood absent.	40 8	40·9	Serum ear absent, blood absent.	40·3	40 9	Serum ear absent, blood absent.	40·9	41·1
3rd ,, ...	Ear serum numerous, blood absent.	40·0	40·7	,, ,, ...	40·1	40·8	,, ,, ...	40·3	41·1
4th ,, ...	Ear serum few, blood absent.	39·9	40·1	,, ,, ...	40·2	40·8	,, ,, ...	40·5	40
5th ,, ...	Ear serum absent, blood few.	40·0	40·8	Serum ear absent, blood few.	40·2	39·9	,, ,, ...	39·9	41·4
6th ,, ...	Ear serum numerous, blood few.	40·2	40·7	Œdema absent, blood absent.	39·6	40·2	,, ,, ...	40·9	41
7th ,, ...	Blood absent ...	40·1	40·1	Blood numerous.	39·8	39·7	Blood absent ...	40·3	41·3
8th ,, ...	,, ,, ..	39·3	39·3	Blood numerous, long and active.	38·6	...	,, ,, ...	40·1	41·6
9th ,, ...	Blood numerous.	39·1	39·2	Death.	...	...	,, few ...	40·6	40·8
10th ,, ...	Death.	...	...	......	...	...	,, ,, ...	39·9	39·8
11th ,, ...	......	...	...	......	...	...	,, ,, ...	39·6	39·6
12th ,, ...	......	...	...	......	...	...	,, ,, ...	40·2	40·5
13th ,, ...	......	...	...	......	...	...	,, ,, ...	40·7	40·9
14th ,, ...	......	...	...	......	...	...	One hæmatozoon in testicle fluid.	40·8	40·8
15th ,, ...	......	...	...	......	...	...	Blood absent ...	41	40·8
16th ,, ...	......	...	...	......	...	...	,, ,, ...	40·5	40·9
17th ,, ...	......	...	...	......	..	...	,, ,, ...	40·4	40·8
18th ,, ...	......	...	...	......	...	..	,, ,, ...	40·4	39·8
19th ,, ...	......	...	...	......	..	...	,, ,, ..	40·2	40·4
20th ,, ...	.....	...	...	......	...	...	,, ,, ...	40·2	40·5
21st ,, ...	......	...	...	......	...	...	,, few ...	40	40·8
22nd ,, ...	......	...	...	......	...	...	,, ,, ...	39·4	40·1
23rd ,, ...	......	...	...	......	...	...	,, ,, ...	39·3	40·1
24th ,, ...	......	...	...	......	...	...	,, ,, ...	40·1	40·1
25th ,, ...	.....	...	...	......	...	...	,, ,, ...	40	40
26th ,, ...	......	...	...	......	...	...	*Death.*	...	...

December 15th.—The blood of all three rabbits presents an increased number of white corpuscles.

18th.—C only noticed one hæmatozoon in the two specimens of the blood.

23rd.—Both ears of *A* are swollen and œdematous; on examination of the œdema-fluid, no hæmatozoa were discovered.

24th.—The ears of *A* more œdematous.

25th.—The ears of *A*.—The œdema has increased.

26th.—*A*—Face generally increased in size, ears red in colour, hot and œdematous; eyelids swollen. Hæmatozoa absent from the blood. From the right and left ears when pricked, perfectly clear, colourless serum exudes. On examination it is found to contain large and active hæmatozoa, 7 to 10 in each field of the microscope. The saliva contains no hæmatozoa.

B—Face swollen, eyelids almost closed from the œdematous condition of the lids.

27th.—*A*—The exudation from the ears is now yellow in colour and appears to be identical with the exudation present in Horse Surra; the former contains large numbers of hæmatozoa; these for the most part are not found singly, but in twos and threes, joined together at the extremity, and whirl round and round. The individual hæmatozoon is large; each presents one, sometimes two dark granules, the largest occupying the middle of the body when at rest. In the serum of the ear, the hæmatozoa are numerous, but there are only few in the blood.

28th.—*A*—Tunica vaginalis of the left testicle is somewhat distended with fluid which on microscopical examination is found to contain numerous round granules, varying considerably in size, but no hæmatozoa. *Prepuce* is œdematous, hæmatozoa numerous in the fluid; here they are observed singly, in pairs (end to end) and in stars. In some fields, there are as many as 200 hæmatozoa present, the majority of which have the granule or granules in the broad part of the body. The *prepuces* of *B* and *C* are in a similar condition to that of *A*.

29th.—The fluid taken from tunica vaginalis of *A*, from which the hæmatozoa were yesterday absent, contains this morning numerous organisms and the individual hæmatozoon is well developed.

30th.—*A*—Œdema disappearing from the ears, slight amount present involving the left ear. Hæmatozoa absent from the blood, but there are a few present in the œdematous fluid from the left ear.

Rabbit A.—Inoculated 12th December 1890, died 10th January 1891, 29 days.

AUTOPSY 2 hours after death.

Lungs.—The apices and free edges of both lungs are the seat of emphysema. The right one presents hypostatic congestion on its superior surface; the left one is a pale pink in colour.

Stomach.—Distended with semi-digested green food. Mucous membrane is of a reddish tint, is thickened, but there are no extravasations.

Liver.—Large and friable.

Spleen and *Kidneys.*—Organs appear healthy.

Rabbit B.—Inoculated 12th December 1890, died 8th January 1891, 27 days.

AUTOPSY.—Half an hour after death.

Body somewhat emaciated.

Lungs.—Localized emphysema at the apices and along the free edges; on section fluid blood exudes freely from the cut surfaces, and frothy mucus escapes from the cut ends of the bronchial tubes.

Heart.—Distended with blood clots; no sub-endocardial petechiæ.

Liver.—Large.

Spleen.—Somewhat enlarged and presents several small petechiæ on the surface of the capsule.

Kidneys.—Capsules strip easily and reveal the presence of several round petechiated spots on the cortical surface of each organ.

Bladder.—Distended with urine, otherwise healthy.

Rabbit C.—Inoculated, 12th December 1890, died 26th January 1891, 45 days.

AUTOPSY.—Six hours after death, the animal dying in the early morning.

Body emaciated. Eyelids glued together with dried purulent secretion. The openings of the nostrils are in a similar condition; *on section* nasal mucous membrane presents a dark red colour and is covered with a purulent secretion.

Lungs.—The right lung is the seat of localized emphysema at the apex and free edges. The left lung presents a condition of general emphysema throughout its whole substance.

Spleen.—Small, healthy.

Liver.—Large, but apparently the tissues are healthy. There are some enlarged glands in the abdominal cavity, lying in front, and to the left side of lumbar vertebræ.

Control Rabbit.—Inoculated 12th December 1890, died 28th January 1891, 47 days.

AUTOPSY.—Twenty minutes after death.

Body emaciated.—*Lungs*—Localized emphysema of the apices and inferior borders. *Heart,* distended with blood, no extravasations. *Liver, Spleen* and *Kidneys* appear healthy to the naked eye, both externally and on section.

GUINEA-PIGS.

INJECTED WITH FILTERED BLOOD SERUM.

10*th December* 1890.—Fresh blood containing numerous hæmatozoa was drawn from Horse No. III immediately after death, into sterilized glass vessels and set aside for several hours in order to allow the serum to separate. The serum was then collected and forced through one of M. Pasteur's porcelain cylinders.

Month and Date.	*Guinea-Pig X.*			*Guinea-Pig Y.*		
	Condition of blood.	Temperature °C.		Condition of blood.	Temperature°C.	
		A.M.	P.M.		A.M.	P.M.
1890.						
December						
10th..	Injected subcut. 2c.c.			Injected subcut. 2c.c.		
11th...	,, ,, 2c.c. ...	39·8	40·1	,, ,, 2c.c. [...	39·3	39·3
* 12th...	,, ,, 2c.c. ...	40·1	39·3	,, ,, 2c.c. ...	39·4	39·8
13th...	Hæmatozoa absent	39·6	39·5	Hæmatozoa absent	39·6	39·8
14th...	,, ,, ...	39·6	39·4	,, ,, ...	39·9	39·7
15th...	,, ,, ...	39·5	39·5	,, ,, ...	39·5	39·6
16th...	Great increase of white corpuscles. Hæmatozoa absent ...	39·2	40·	Increase of white corpuscles ... Hæmatozoa absent	39·1	39·7
17th...	,, ,, ...	39·2	39·2	,, ,, ...	39·3	39·3
18th...	,, ,, ...	39·3	39·2	,, ,, ...	39·8	40·
19th...	,, ,, ...	39·4	39·6	,, ,, ...	39·7	39·9
20th .	,, numerous ...	39·4	40·	,, few	39·9	39·3
21st...	,, ,, ...	40·2	40·1	,, few and active ..	40·4	40·5
22nd...	,, ,, ..	39·9	39·8	,, numerous ...	40·	39·5
23rd...	,, ,, ...	40·	39·8	,, ,, ...	39·7	39·3
24th...	,, very numerous.	39·3	39·5	,, very numerous ...	39·7	39·2
25th...	,, ,, ...	39·1	39·1	,, numerous	39·1	39·2
26th...	,, ,, ...	39·7	39·7	,, few	39·5	39·4
27th...	,, ,, ...	39·6	39·8	,, numerous	39·2	39·2
28th...	,, numerous.	39·5	39·7	,, ,, ...	39·1	39·3
29th...	,, absent ...	39·3	39·6	,, ,, ...	39·6	39·9
30th...	,, numerous.	39·5	39·8	,, ,, ...	39·7	39·9
31st...	,, ,, ...	39·7	39·3	,, few	39·4	39·9
January						
1st...	,, swarming...	39·2	39·8	,, numerous (torpid).	39·5	39·8
2nd...	,, numerous.	39·2	39·5	,, numerous	39·5	39·8
3rd...	,, ,, ...	38·3	39·1	,, ,, ...	39·2	39·4
4th...	,, ,, ...	38·6	39·2	,, ,, ...	38·8	39·5
5th...	,, ,, ...	38·8	39·2	,, few	38·6	39·3
6th...	,, ,, ...	38·8	39·3	,, ,, ...	38·7	39·1
7th...	,, ,, ...	39·2	39·4	,, absent	39·3	39·8
8th...	,, ,, ...	39·3	39·6	,, few	39·7	40·1
9th...	,, very numerous.	39·	39·8	,, ,, ...	40·1	39·8
10th...	....	39·2	39·6	....	39·7	39·9
11th...	,, swarming...	39·3	39·3	,, absent	40·	40·
12th..	,, ,, ...	39·4	39·7	,, few	39·8	39·9
13th...	,, ,, ...	40·3	40·3	,, ,, ...	40·2	40·4
14th...	,, very numerous.	40·1	39·8	,, ,, ...	40·	39·9
15th...	,, ,, ...	39·4	39·5	,, absent	39·3	39·4
16th...	,, ,, ...	39·4	39·6	,, ,, ...	39·2	39·3
17th...	,, ,, ...	39·2	39·4	,, ,, ...	39·1	39·2
18th...	,, ,, ...	39·2	39·9	,, ,, ...	39·	39·9
19th...	,, ,, ...	39·8	39·9	,, few	39·9	39·8
20th...	,, ,, ...	39·8	39·9	,, absent	39·9	39·8
21st..	,, ,, ...	39·8	39·1	,, ,, ...	39·6	40·2
22nd...	Found dead at 6 A. M.	...	...	,, few	40·2	39·8
23rd...	....	...	...	,, absent	39·3	40·
24th ..	....	...	...	,, few	39·6	40·2
25th...	....	...	...	,, absent	39·3	39·2
26th ..	....	...	...	,, ,, ...	39·5	39·9

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* *December 12th, 1890.* 5 P.M. Inoculated each animal with ·2 c.c. of blood containing numerous hæmatozoa, taken from Guinea-Pig No. II of November 2nd, 1890. A third animal was inoculated at the same time to act as a control experiment.

Guinea-Pig Y.—continued.				*Guinea-Pig Control.*			
Month and Date.	Condition of Blood.	Temperature °C.		Month and Date.	Condition of Blood.	Temperature °C.	
		A.M.	P.M.			A.M.	P.M.
1891.				1890.			
January				December.			
27th...	Hæmatozoa few	38·6	38·9	12th...	Inoc. subcut. ·2c.c blood.		
28th...	,, ,, ...	38·6	38·8	13th ..	Hæmatozoa absent ...	39·6	39·5
29th...	,, absent ...	38·5	39 6	14th...	,, ,, ...	39·6	39·7
30th...	,, ,, ...	40·5	38·8	15th...	,, ,, ...	39·3	39·7
31st ..	,, ,, ...	38·8	39·8	16th...	,, ,, ...	39·8	39·9
February				17th...	,, ,, ...	39·6	39·5
1st...	,, ,, ...	39·8	38·7	18th...	,, ,, ...	39·2	39·4
2nd...	,, ,, ...	38·6	38 6	19th...	,, ,, ...	39·2	39·4
3rd...	,, ,, ...	39·4	39 6	20th ...	,, few ...	39·6	39·5
4th...	,, ,, ...	38·5	40·1	21st...	,, numerous ...	39·5	39·7
5th...	,, ,, ...	39·3	39·6	22nd...	,, ,, ...	39·4	39·7
6th...	,, ,, ...	39·1	39·4	23rd...	,, ,, ...	39·5	39·6
7th...	,, ,, ...	39·6	39·8	24th...	,, absent ...	39·3	39·5
8th...	,, few	39·7	39·8	25th...	,, ,, ...	39·6	39·7
9th .	,, absent ...	39·4	39·7	26th...	,, few ...	39·4	39·7
10th...	,, ,, ...	39·5	39·8	27th...	,, very numerous.	39·2	39·5
11th...	,, ,, ...	39·8	39·9	28th...	,, ,, ...	39·3	39·9
12th ..	,, ,, ...	39·8	39·8	29th...	,, ,, ...	39·6	39·8
13th...	,, few ..	39·5	39·8	30th...	,, few	39·4	39·5
14th...	,, absent ...	40·8	40·4	31st...	,, ,, ...	40·5	40·7
15th ..	,, ,, ...	40·2	40·4	January			
16th...	,, ,, ...	40·2	40·	1st ...	,, very numerous.	40·3	40·6
17th...	,, ,, ...	40·	40·3	2nd ...	,, ,, ...	40·3	40·7
18th...	,, ,, ..	40·1	40·1	3rd ...	,, ,, ...	40·4	40 6
19th...	,, ,, ...	40·2	40·4	4th ...	,, ,, ..	40·1	40·3
20th ..	,, ,, ..	40·4	40·6	5th ...	,, ,, ...	40·4	40·5
21st...	,, ,, ...	40·3	40·4	6th ...	,, ,, .	40·8	40·7
22nd .	,, few	40·2	40·5	7th ...	,, numerous .	39·6	39·7
23rd...	,, ,, ...	40·1	*Death.*	8th ...	,, ,, ..	39·5	39·7

Guinea-Pig Control.

Month and Date.	Condition of Blood.	Temperature °C.		Month and Date.	Condition of Blood.	Temperature °C.	
		A.M.	P.M.			A.M.	P.M.
1891.							
January				February			
9th...	Hæmatozoa very numerous.	39·4	39·6	10th...	Hæmatozoa absent ...	40·4	40·5
10th...	,, ,, ...	40·3	40·5	11th...	,, ,, ...	40·2	40·6
11th...	,, ,, ...	40·5	40·7	12th...	,, ,, ...	40·4	40·5
12th ..	,, ,, ...	40·3	40·5	13th...	,, ,, ...	40·1	40·6
13th...	,, ,, ...	40·3	40·6	14th...	,, numerous ...	40·3	40·5
14th...	,, ,, ...	40·4	40·8	15th...	,, absent ...	40·2	40·4
15th...	,, ,, ...	40·5	40·6	16th..	,, ,, ...	40·2	40·6
16th...	,, ,, ...	40·3	40·5	17th...	,, ,, ...	40·5	40·4
17th...	,, numerous.	40·1	40·4	18th...	,, ,, ...	40·2	40·6
18th...	,, ,, ...	39·7	40·3	19th...	,, ,, ...	40·4	40·6
19th...	,, few ...	40·3	40·4	20th...	,, few ...	40·2	40·6
20th...	,, ,, ...	39·9	40·2	21st...	,, ,, ...	40·3	40·5
21st ...	,, ,, ...	39·5	40·2	22nd...	,, ,, ...	40·6	40·5
22nd...	,, numerous.	39 5	39·8	23rd ..	,, ,, ...	39·9	39·8
23rd...	,, ,, ...	39·4	40·2	24th...	,, ,, ..	39·9	40·5
24th...	,, few ...	40·1	40·9	25th...	,, absent ...	40·2	40·6
25th...	,, absent ..	40·7	40·8	26th...	,, ,, ...	40·5	40·6
26th ..	,, ,, ...	40·3	40·5	27th...	,, few ...	40·5	40·7
27th...	,, ,, ...	40·2	40·7	28th...	,, ,, ...	40·5	40·8
28th...	,, ,, ...	40·5	40·8	March			
29th...	,, ,, ...	40·5	41·7	1st...	,, ,, ..	40·6	40·8
30th...	,, ,, ...	41·5	41·6	2nd...	,, ,, ...	40·5	40·2
31st...	,, ,, ...	40·8	40·5	3rd ..	,, ,, ...	39·7	40·5
February				4th...	,, absent ...	40·3	40·7
1st...	,, ,, ...	40·1	40·8	5th...	,, ,, ...	40·5	40·7
2nd...	,, ,, ...	40·5	40·7	6th...	,, few ...	40·5	40·6
3rd...	,, ,, ...	40·5	40·8	7th...	,, ,, ...	40·3	40·7
4th...	,, few ...	40·4	40·5	8th...	,, absent ...	40·5	40·7
5th...	,, very numerous.	40·1	40·4	9th ..	,, few ...	40·5	40·6
6th...	,, numerous.	40·5	40·4	10th. .	,, absent ...	40·5	40·9
7th...	,, few ...	40·	40·6	11th...	,, ,, ...	40·8	40·8
8th...	,, absent... ...	40·3	40·5	12th...	,, few ...	40·6	40·9
9th...	,, ,, ...	40·2	40·7	13th...	*Death.*		

GUINEA-PIG X.

AUTOPSY.—Body fairly well nourished, the right fore-foot is much enlarged (4 × 1) and there is an ulcer on the pad of the foot.

Lungs—Are well distended with air, and *on section,* blood flows from the cut surfaces.

Heart.—Distended with blood; healthy.

Liver.—Large, dark in colour, but healthy.

Gall Bladder.—Distended with clear coloured fluid.

Spleen.—Enlarged; weighs 4·5 grammes, 67 grains.

Kidneys.—Dotted over surface with petechiæ.

Stomach.—Healthy.

Bladder.—Healthy.

GUINEA-PIG Y.

AUTOPSY.—Body is emaciated, especially the muscles of the back.

Lungs.—There is localized emphysema, especially noticeable at the apices and free edges of the organs. The lower $\frac{2}{3}$rds of the anterior lobes are consolidated and present a deep red colour.

Liver.—Large and dark red in colour, but apparently healthy.

Gall bladder.—Distended with clear fluid.

Spleen.—Enlarged to twice the normal size: weighs 15 grains.

Kidneys.—Large, capsules strip easily, numerous petechiæ, several $\frac{1}{6}$th inch in diameter on the external cortical surface of the organ.

Stomach.—Some congestion close to pylorus, but no ulceration.

Bladder.—Healthy.

CONTROL.

AUTOPSY at 10 A.M.

Body emaciated.

Lungs.—Localized emphysema of the apices and free edges, œdema of the posterior lobes.

Heart.—Distended with clots, no lesions.

Liver.—Large, dark brown in colour.

Spleen.—Enlarged, three times natural size, firm and healthy looking on section.

Stomach.—Healthy.

Kidneys.—Healthy.

GUINEA-PIGS.

SUBCUTANEOUSLY INJECTED WITH PROTEID SUBSTANCE OBTAINED FROM THE BLOOD OF THE HORSE.

Ogata* described a method of isolating from the blood of dogs and fowls substances capable of conferring immunity in the first instance against anthrax, and in the second against swine Erysipelas.

In this series of experiments, a certain quantity of blood was withdrawn from the Jugular Vein of a horse, after the hæmatozoon of Surra had been found swarming in it for two or three days previously and subjected to the following process recommended by Ogata. To every part of blood taken ten to fifteen parts of a mixture of equal parts of absolute Alcohol and Ether were added. The precipitate which formed was then collected after forty-eight hours, dried and powdered and extracted with water and Glycerine. After filtration, Alcohol and Ether were again added, and produced a white flocculent precipitate, which after solution in Glycerine and water was used for injection into animals.

Three Guinea-pigs were subjected to daily injection of this fluid in varying quantities. No. I received 0·5 c.c., No. II 0·75 c.c. and No. III 1·0 c.c.; after each animal had received eleven injections, seven days were allowed to elapse, and on the eighth, all were inoculated with an equal quantity, *viz*: 0·2 c.c. of blood containing numerous hæmatozoa taken from Horse No. LXXI, the subject of *Naturally acquired Surra.* At the same time a healthy animal was inoculated with a similar quantity to act as a Control experiment. Under the following headings will be seen the daily observations with regard to temperature and the condition of the blood in each case:—

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* Ogata, Professor of Tokyo. On the antibacillic substance of blood.
Sei-I-Kwai. Med. Journal. May 23rd, 1891.

No. I—Guinea-Pig.

Month and Date.	Quantity injected.	Blood.	Temperature°C.	
			A. M.	P. M.
1892.				
16th September...	·5c.c.	Normal in character.	38·3	39·3
17th ,, ..	·5c.c.	,, ...	39 3	39·4
18th ,, ...	·5c.c.	,, ...	39·3	40
19th ,, ...	·5c.c.	,, ...	38·6	40·1
20th ,, ...	·5c.c.	,, ...	38 6	40
21st ,, ...	·5c.c.	,, ...	39	40·2
22nd ,, ...	·5c.c.	,, ...	39·6	40·6
23rd ,, ...	·5c.c.	,, ...	40·1	40
24th ,, ...	·5c.c.	,, ...	40	40
25th ,, ...	·5c.c	,, ...	39·1	39·2
26th ,, ...	·5c.c.	,, ...	39·1	39·7
27th ,, ...	...	,, ...	39·2	39·7
28th ,, ...	...	,, ...	39·6	39·8
29th ,, ...	...	,, ...	39·3	40
30th ,, ...	...	,, ...	40·1	40·1
1st October ...	...	,, ...	39·7	40
2nd ,, ...	...	,, ...	40	40·1
3rd ,, ...	...	Inoculated with 0·2 c. c. Horse Surra blood.	40	39·6
4th ,, ...	...	Hæmato. absent.	39·3	40
5th ,, ...	...	,, absent ...	38·3	40·5
6th ,, ...	..	,, ,, ...	39·7	40·4
7th ,, ...	...	,, few ...	38·8	39·5
8th ,, ...	...	,, numerous	37·5	39·8
9th ,, ...	...	,, very numerous.	38·5	40·2
10th ,, ...	...	,, swarming	39·5	40·5
11th ,, ...	...	,, numerous	39·7	39·4
12th ,, ...	...	,, ,, ...	38·5	40
13th ,, ...	...	,, swarming	38·6	39·7
14th ,, ...	...	,, ,, ...	40	39·7
15th ,, ...	...	,, ,, ...	39	40·1
16th ,, ..	...	,, ,, ...	39·2	40·1
17th ,, ...	...	,, numerous	39·4	40
18th ,, ...	...	,, absent ...	38·4	39·8
19th ,, ...	...	,, few ...	38·4	39·1
20th ,, ...	...	,, numerous	39	39·5
21st ,, ...	...	,, ,, ...	38·6	39
22nd ,, ...	...	,, swarming	40	39·8
23rd ,, ...	...	,, ,, ...	38·4	39·8
24th ,, ...	...	,, ,, ...	39·4	39·6
25th ,, ..	...	,, ,, ...	39·2	40
26th ,, ...	...	,, very numerous.	39·6	40
27th ,, ...	...	,, ,, ...	38·2	39·6
28th ,, ...	...	,, ,, ...	38·8	40·2
29th October ...	...	Hæmatozoa very numerous	40	40·2
30th ,, ...	...	,, ,, ...	39·8	40·4
31st ,, ...	...	,, ,, ...	38·8	39·6
1st November ...	...	,, ,, ...	38·4	39·6
2nd ,, ...	...	,, ,, ...	38·4	39·4
3rd ,, ...	...	,, swarming	38·8	40·4
4th ,, ...	...	,, ,, ...	39·8	40·6
5th ,, ...	..	,, ,, ...	40·2	40·6
6th ,, ...	...	,, ,, ...	40	40·6
7th ,, ...	...	,, few ...	40·2	40·3
8th ,, ...	...	,, ,, ...	39·2	40·2
9th ,, ...	...	,, ,, ..	39·7	40·1
10th ,, ...	...	,, ,, ...	39·6	40·8
11th ,, ...	...	,, numerous	40	40·2
12th ,, ...	...	,, ,, ...	38·8	40·6
13th ,, ...	...	,, very numerous.	39·4	40·4
14th ,, ...	...	,, swarming	39·8	40·4
15th ,, ...	...	,, ,, ...	39·2	40·6
16th ,, ...	...	,, few ...	40·3	39·8
17th ,, ...	...	,, numerous	38·8	40
18th ,, ...	...	,, swarming	38·4	39·8
19th ,, ...	...	,, ,, ..	38·2	40·4
20th ,, ..	...	,, ,, ..	40·2	40·6
21st ,, ...	...	,, ,, ...	38·6	40
22nd ,, ...	...	,, ,, ...	39	40·1
23rd ,, ...	...	,, ,, ...	39·8	40
24th ,, ...	...	,, ,, ..	39·4	40
25th ,, ...	...	,, ,, ...	39·1	40·4
26th ,, ...	...	,, ,, ...	40·2	40·7
27th ,, ...	...	,, numerous	40·8	40·2
28th ,, ...	...	,, ,, ...	39·2	40·1
29th ,, ...	...	,, very numerous.	39·8	40·3
30th ,, ...	...	,, ,, .	40·4	40·2
1st December ...	...	,, numerous	40·2	40·6
2nd ,, ...	...	,, absent ...	39·6	40·8
3rd ,, ...	...	,, ,, ...	40 4	40·6
4th ,, ...	...	,, ,, ...	39·8	40·6
5th ,, ...	...	,, ,, ...	40·4	40·2
6th ,, ...	...	,, numerous	40·4	40·2
7th ,, ...	...	,, swarming	40·2	40·4
8th ,, ...	...	,, ,, ...	40	39·6
9th ,, ...	...	,, ,, ...	39·3	40·2
10th ,, ...	...	,, ,, ...	37·6	39·6
11th ,, ...	...	,, ,, ...	37·8	39·2
12th ,, ...	...	,, ,, ...	35	*Death.*

No. II—Guinea-Pig.

Month and Date.	Quantity injected.	Blood.	Temperature°C.	
			A. M.	P. M.
1892.				
16th September...	·75c.c.	Normal in character.	39·1	39·7
17th ,, ...	·75c.c.	,, ...	38·7	40·2
18th ,, ...	·75c.c.	,, ...	39·3	40·3
19th ,, ...	·75c.c.	,, ...	38·5	40·3
20th ,, ...	·75c.c.	,, ...	38·3	40·2
21st ,, ...	·75c.c	,, ...	39·3	40·5
22nd ,, ...	·75c.c.	,, ...	40	40·3
23rd ,, ...	·75c.c.	,, ...	39·3	40·2
24th ,, ...	·75c.c.	,, ...	39·8	40
25th ,, ...	·75c.c.	,, ..	39·3	39·4
26th ,, ...	·75c.c.	,, ...	39·3	40·1
27th ,, ...	...	,, ...	39·1	39·8
28th ,, ...	...	,, ...	39·6	40
29th ,, ...	...	,, —	40	40·2
30th ,, ...	...	,, ...	40	40·2
1st October ...	...	,, ...	39·8	40·1
2nd ,, ...	...	,, ...	39 6	39·7
3rd ,, ...	...	Inoculated with 0·2 c.c. Horse Surra blood.	39·3	40·2
4th ,, ...	...	Hæmato. absent.	39·3	40·3
5th October ..	...	Hæmato. absent.	39·3	40·6
6th ,, ...	...	,, few ..	40·1	40·3
7th ,, ...	...	,, numerous	39·7	40
8th ,, ...	...	,, very numerous.	38·7	40
9th ,, ...	...	,, ,, ...	39	40·3
10th ,, ...	...	,, swarming	39·4	40·2
11th ,, ...	...	,, few ...	39·7	39·8
12th ,, ...	...	,, very numerous.	38·8	39·6
13th ,, ...	...	,, swarming	38·5	39·8
14th ,, ...	...	,, ,, .	39·5	39·3
15th ,, ...	...	,, few ...	39·1	39·7
16th ,, ...	...	,, absent ...	38 8	39·5
17th ,, ...	...	,, few ...	38·8	39·3
18th ,, ...	...	,, numerous	38·6	39·6
19th ,, ...	...	,, ,, ...	38·8	39·6
20th ,, ...	...	,, swarming	39	40
21st ,, ...	...	,, ,, ...	38·8	39·6
22nd ,, ...	...	,, ,, ...	39·6	39·2
23rd ,, ...	...	,, ,, ...	38·6	39·4
24th ,, ...	...	,, ,, ...	38·4	39·6
25th ,, ...	...	......	35	*Death.*

No. III.—Guinea-Pig. *Control Guinea-Pig.*

Month and Date.	Quantity injected.	Blood.	Temperature °C.		Month and Date.	Quantity injected.	Blood.	Temperature °C.	
			A.M.	P.M.				A.M.	P.M.
1892.									
September									
16th...	1c.c.	Normal in character ...	38·3	40	October				
17th...	1c.c.	,,	39·1	40·4	3rd...	...	Inoculated with 0·2c.c.	...	40
18th...	1c.c.	,,	39·3	40·1		...	Horse Surra blood.		
19th...	1c.c.	,,	39·1	40	4th...	...	Hæmatozoa absent ...	38·6	40
20th...	1c.c.	,,	38·6	39·8	5th...	...	,, ,, ...	38·6	39·8
21st ...	1c.c.	,,	37·7	40	6th...	...	,, ,, ...	39·3	39·7
22nd...	1c.c.	,,	39·3	39·8	7th...	...	,, ,, ...	39·1	39·4
23rd...	1c.c.	,,	40	40·2	8th...	...	,, few ...	39·8	40·4
24th...	1c.c.	,,	40	40·2	9th...	...	,, numerous .	39·3	40
25th...	1c.c.	,,	40	39·4	10th...	...	,, few ...	40·2	40·2
26th...	1c.c.	,,	40·3	40	11th...	...	,, ,, ..	39·5	39·7
27th...	...	,,	39·3	40·3	12th..	...	,, ,, ...	38·6	39·7
28th...	...	,,	40	39·2	13th...	...	,, numerous .	39·1	39·6
29th...	...	,,	39·8	40·2	14th...	...	,, very numerous .	39·7	39·8
30th...	...	,,	39·7	39·7	15th...	...	,, swarming ...	39·3	39·7
October		,,			16th...	...	,, ,, ...	39·3	40·3
1st ...	..	,,	39	40·2	17th...	...	,, ,, ...	38·7	39·3
2nd...	...	,,	39·6	39·3	18th...	...	,, ,, ...	38·6	39
3rd...	...	Inoculated with 0·2c.c.	39·3	39·8	19th...	...	,, ,, ..	38·2	39·9
		Horse Surra blood.	39·7	40·1	20th...	...	,, ,, ..	38·2	39·8
4th...	...	Hæmatozoa absent ...			21st ...	...	,, ,, ...	38·6	39 4
5th...	...	,, ,, ...	39·3	40·3	22nd .	...	,, ,, ...	39·4	39
6th...	...	,, ,, ...	40	40·3	23rd...	...	,, very numerous .	38·4	39·4
7th...	...	,, few ...	39	39·2	24th...	...	,, few	38·6	39
8th...	...	,, numerous .	38·5	39·8	25th...	...	,, ,, ...	39·2	39·4
9th...	...	,, ,, ...	38·8	39·6	26th...	...	,, numerous ...	39·2	39·6
10th...	...	,, very numerous .	38·6	40·1	27th...	...	,, very numerous .	38·2	40
11th...	...	,, ,, ...	39·7	39·5	28th...	...	,, ,, ...	39·4	40·4
12th...	...	,, numerous ...	38·4	39·6	29th...	...	,, few	40·6	40·6
13th...	...	,, swarming ...	38·5	39·6	30th...	...	,, ,, ...	39·4	40
14th...	...	,, ,, ...	39·2	39·4	31st ...	...	,, ,, ...	38·8	39·6
15th...	...	,, ,, ...	38·2	39·4	November				
16th...	...	,, ,, ...	39·1	40·3	1st ...	...	,, ,, ...	38·4	39·4
17th...	...	Hæmatozoa very numerous	39·1	38·8	2nd...	...	,, ,, ...	37·2	39
					3rd...	...	,, ,, ...	38	39·4
18th...	...	,, absent ...	38·2	39·1	4th...	...	Hæmatozoa numerous .	38·8	39·9
19th...	...	,, few ...	38·2	39·2	5th...	...	,, very numerous .	39·4	40
20th ..	...	,, ,, ...	38·6	39	6th...	...	,, swarming ...	39·4	40·2
21st ...	...	,, swarming ...	38·2	39·1	7th...	...	,, ,, ...	40	49
22nd .	...	,, ,, ...	39·8	40	8th...	...	,, ,, ...	39·4	30·8
23rd...	...	,, ,, ...	37·7	40·2	9th...	...	,, ,, ...	39·8	40
24th ..	...	,, ,, ...	39·1	40	10th...	...	,, ,, ...	39·8	40·2
25th...	...	,, ,, ...	39·6	39·8	11th...	...	,, ,, ...	39·2	40
26th. .	...	,, ,, ...	39·5	39·6	12th...	...	,, ,, ...	38·4	40·4
27th...	...	,, ,, ...	38·4	39·8	13th...	...	,, ,, ...	38·6	40
28th...	...	,, ,, ...	39	40	14th...	...	,, very numerous .	38·6	39·6
29th...	...	,, ,, ...	39·4	40·6	15th...	...	,, ,, ...	38·2	39·6
30th...	...	,, ,, ...	39·2	39·8	16th...	...	,, swarming ..	38·8	40
31st ...	...	,, ,, ...	39·2	39·8	17th...	...	,, ,, ...	37·4	39·6
November					18th .	...	,, ,, ...	38	40·2
1st ...	...	*Death* at 1 P.M. ...	35	...	19th...	...	,, ,, ...	36	*Death.*

Remarks.—For this experiment three Guinea-pigs were subjected to daily injection subcutaneously with a mixture of proteid material mixed with Glycerine and Water, the proteid having been obtained from the blood of a horse suffering from Surra. At a later date the above, together with a fourth as a Control animal, were each inoculated with 0·2 c.c. of blood containing numerous hæmatozoa, drawn from the Jugular Vein of Horse No. LXXI, the subject of naturally acquired Surra.

(i).	Guinea-pig received	0·5 c. c. × 11	of Proteid	and lived	70 days.
(ii).	,,	0·75 c. c. × 11	,,	,,	22 ,,
(iii).	,,	1·0 c. c. × 11	,,	,,	29 ,,
Control				,,	47 ,,

It will thus be observed that Guinea-pig No. (i), which received the smallest quantity of Proteid material, survived animal No. (ii) by 48 days, No. (iii) by 41 days and the Control by 23 days.

SUBCUTANEOUS INJECTION OF GUINEA-PIGS WITH BLOOD DRAWN FROM A BULL INOCULATED, AND AT A LATER DATE RE-INOCULATED WITH SURRA.

As is before noted, the loss of virulence—on introduction of the hæmatozoon into the bovine species—points to the fact that there may be a possibility of producing some form of immunity in other species of animals, by the introduction either subcutaneously or by intravenous injection of the blood itself or of the proteid material obtained from the blood of bovines some time after their inoculation with Surra.

With this end in view a series of experiments were undertaken with the object of ascertaining—

(I) Whether the further progress of the disease could be checked in Guinea-pigs —in the blood of which hæmatozoa were present—by the subcutaneous injection of small quantities of fresh bovine blood at intervals of a few days. The bull from which the blood was to be taken having been inoculated and at a later date reinoculated with Surra.

Experiment (*i*).—Guinea-pig inoculated with 0·25 c.c. of blood on the 12th November 1892, taken from the Jugular Vein of Horse No. LXXIII. The hæmatozoon made its appearance in the blood 12 days later on 24th November 1892. On December 5th, 8th, 13th and 15th, respectively, the animal received subcutaneously 1·0 c. c. of blood drawn from Bull No. I (inoculated with Surra on 24th March 1891 and re-inoculated after an interval of 17 months on 22nd August 1892). Death took place on the 25th February 1893, one hundred and five (105) days after inoculation.

Experiment (*ii*).—Guinea-pig inoculated on the 12th November 1892 with 0·3 c.c. of blood taken from the Jugular Vein of Horse No. LXXIII. The hæmatozoon made its appearance in the blood 12 days later on 24th November 1892. On the 5th, 8th, 13th and 15th December respectively the animal received subcutaneously 1·0 c. c. of blood drawn from Bull No. I (inoculated, &c., as in the former experiment). Death took place on the 12th March 1893, one hundred and twenty (120) days after inoculation.

Experiment (*iii*).—A Guinea-pig was inoculated on 21st September 1892 with 0·2 c. c. of blood drawn from the ear of Bull No. III. The hæmatozoon made its appearance in the blood 13 days later, on the 4th October 1892. The animal received subcutaneously 1·0 c. c. of fresh blood on the 5th, 8th, 13th and 15th of December drawn from Bull No. I (inoculated, &c., as in experiments Nos. i and ii). Death took place on the 1st February 1893, one hundred and thirty-three (133) days after inoculation.

(II) Whether by subjecting Guinea-pigs to the influence of small quantities of bovine blood at intervals of a few days and subsequently inoculating them with Surra, the disease would be retarded or in any way affected by the previous injections of Bull's blood.

Experiment.—Two healthy Guinea-pigs were injected on the 5th, 8th, 13th and 15th December 1892, respectively, with 1·0 c. c. of blood drawn from Bull No. I (inoculated on 24th March 1891, and re-inoculated on 22nd August 1892 with Surra). At a later date 18th December 1892, both Guinea-pigs were inoculated with Surra blood drawn from a Guinea-pig previously inoculated from the horso in whose blood the hæmatozoon was present.

No. I Guinea-pig died on 6th February 1893, fifty (50) days after inoculation.

No. II Guinea-pig died on 22nd March 1893, ninety-four (94) days after inoculation.

Remarks.—The Guinea-pigs in the first experiment succumbed in 105, 120 and 133 days, respectively, and on reference to the case of Bull No. I it will be observed that three out of four animals of the same species when inoculated directly from the Bull and the disease allowed to run its natural course succumbed in 144, 117 and 102 days respectively. Consequently the average length of life in the former animals was 119 days against the 121 days in the latter, or a difference of three days in favour of those experimentally treated.

In the second series of experiments the two animals succumbed in 50 and 94 days respectively. But it is impossible to draw conclusions from these few experiments; further trials will therefore have to be made.